PEDIATRIC NURSING

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Of all created things, the loveliest
And most divine are children.

William Canton

PEDIATRIC NURSING

Its Principles and Practice

BY

BESSIE INGERSOLL CUTLER, R.N.

GRADUATE OF MASSACHUSETTS GENERAL HOSPITAL TRAINING SCHOOL FOR NURSES; INSTRUCTOR IN PEDIATRIC NURSING AND SUPERVISOR OF PEDIATRIC DEPARTMENT, UNIVERSITY OF MINNESOTA, MINNEAPOLIS; FORMERLY HEAD NURSE IN CHILDREN'S DEPARTMENT, MASSACHUSETTS GENERAL HOSPITAL, BOSTON; NIGHT SUPERVISOR AT CHILDREN'S HOSPITAL, BOSTON; HEAD NURSE AT CHILDREN'S HOSPITAL, ST. LOUIS, MISSOURI.

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THIS BOOK IS

AFFECTIONATELY DEDICATED

TO MY PARENTS

PREFACE

No claim to originality is made in this book. It has been written primarily for the student nurse. It is simply an attempt to correlate into one volume the information which experience leads me to believe is necessary for her intelligent care of children. The book is not intended to be complete in itself, but is to be used as a text on the nursing care of children in conjunction with lectures on the diseases of children. It is advised that the student be given a list of standard works on pediatrics to which she may refer for more extensive study. In order to stimulate her interest and to create in her a desire to read more, a bibliography has been added which contains the references consulted in the writing of the book, also additional interesting material relating to the subjects discussed in the text. I have had several years of experience in the actual nursing care of children in various parts of the country, but in order to present the subject with sufficient emphasis, it has been necessary to supplement my knowledge with frequent quotations from eminent authorities on pediatrics.

I wish to acknowledge here my indebtedness to Dr. L. Emmett Holt, Dr. J. P. Crozer Griffith, and Dr. Julius Hess for permission to quote from their text-books; and to Dr. W. McKim Marriot for permission to use sections from notes compiled by him for nurses. I wish to express gratitude to Dr. F. C. Rodda and Dr. E. J. Huenekens of the Pediatric Department of the University of Minnesota for their aid; to Dr. A. C. Strachauer for reviewing the chapter "Surgical Nursing Care of Children"; to Dr. J. C. Litzenberg for reviewing the sections on "resuscitation" and the "care of the mother's breasts"; to Dr. Harry P. Ritchie for contributing

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INTRODUCTION

Heaven laughed to find your face so pure and fair,
And left, O little child, its reflex there.

CANTON.

History of the Treatment of Children.

"Century of the Child"

Since it is only within the last fifty years that the child and his welfare have been given serious consideration, the present era has been called the "Century of the Child." Payne says that humanized man has not existed more than a few hundred years and that it is only within the last half century that the race has been concerned with the protection of the child.[1] During this period more has been written on the subject than in all previous civilized times. Previously man had more or less disregarded his most precious possession, his child, who should be looked upon as his sacred pledge to the future.[2] To be sure, children were not entirely neglected by the Ancients.

Treatment of Children in Ancient Times

It was during the reign of Trajan, between 110 A.D. and 130 A.D., that Rome became the home of the greatest obstetrician and pediatrician of antiquity, Soranus of Ephesus, the author of the work which conforms more nearly with modern standards of nursing than any other which appeared before the beginning of the last century. Foote says that excluding our knowledge of antiseptics, abandoning swaddling and wet nursing, and with some editing, the practical instruction is so sound that with surprisingly few changes Soranus's text-book could have been used in the education of the nurse and mother to better advantage than any similar work up to the time of

[1] Payne, George Henry, "The Child in Human Progress."

[2] Foote, John, M.D., "Ancient Poems of Child Hygiene." *Annals of Medical History*, Vol. II, 1919.

Underwood in 1784. Hippocrates and other writers of olden days[3] make mention of the child as do several medieval writers[4]; but when the perfection of the art and philosophy of the early peoples, for example, the cultured Greeks and Romans, is compared with their standards of treatment of their children, one realizes to what extent the latter were neglected. History tells us that before the Christian era some of the early tribes abandoned and actually slaughtered their children without considering it criminal. With the spread of the Christian religion and civilization there developed parental instinct and a more humane treatment of the young. Christ taught that the life and the soul of a child were as precious as those of an adult and that to willfully destroy an infant was murder in the first degree. He elevated and sanctified babyhood and childhood.[5] His was the first voice raised against a high infant mortality. Payne says: "The social, moral, and intellectual condition of women indicates in an ascending scale the degree of civilization of every tribe and nation. It might with equal force be said that the attitude of the tribe or nation toward its young is also a barometer of human progress." (See note 1.)

History of Pediatrics.

Progress in the treatment of the child from a medical point of view has accompanied the slow recognition of the rights of the child from the social point of view. The science which deals with this progress is called "pediatrics" or "the science of healing children." It is composed of two Greek words, "pais," genitive "paidos," meaning the child and "iatrike," the science or art of healing. The first printed literature of Europe on the subject was by Paolo Bagellardo in 1487 and

Meaning of "Pediatrics"

[3] Foote, John, M.D., "An Infant Hygiene Campaign of the Second Century." *Arch. Ped.*, March, 1919.

[4] Ruhräh, John, M.D., "Walter Harris, a Seventeenth Century Pediatrist." *Annals of Medical History*, Vol. II, 1919.

[5] Shaw, Henry L., M.D., "Hospitals for Babies—Retrospect, Introspect, and Prospect." *Arch. Ped.*, Nov., 1921.

by Bartholomeus Metlinger in 1473. These were followed by other works in the next century. Walter Harris made valuable contributions to pediatric literature in 1715 (see note 4). Several other publications of similar value appeared about the same time. Michael Underwood wrote an "Essay on the Diseases of Children" in 1784 and Edward Jenner in 1798 produced his work on variolæ vaccinæ.[6] During the nineteenth century France, England, and Germany gave to the world important works on pediatrics: France by C. Billard, Rilliet, and Barthez; England by Cheyne, who wrote "Essays on Diseases of Children," Charles West, and F. Churchill; and Germany by Bednar, Saulinge, and others. In the English colonies of America the earliest treatise of a medical, in part pediatric, subject was a broadside 12 inches by 17 inches entitled, "A Brief Rule to Guide the Common People of New England How to Order Themselves and Theirs in the Small Pocks or Measles." (See note 6.) It was written by the Reverend Thomas Thatcher and bears the date January 21, 1677–8, a second edition being printed in 1702.

Early Pediatric Literature

Dr. Abraham Jacobi (1830–1919) has been called the "Nestor of American Pediatrics,"[7] and it was through his efforts that the first professional teaching of the subject of diseases of children was started in 1860 at the New York Medical College. He himself occupied the position of teacher. He also founded the American Pediatric Society, was its first president, and was again president in 1906. He was the prime mover in the founding of the section of pediatrics in the New York Academy of Medicine and the American Medical Association.[8] The second chair of pediatrics was founded in 1898 at Harvard. Now there is an ever increasing interest in this specialty and there are many eminent pediatricians in all civilized countries. This interest has produced much litera-

First Professional Teaching of Pediatrics

[6] Jacobi, Abraham, M.D., "History of Pediatrics."

[7] Garrison, Fielding H., M.D., "History of Medicine."

[8] Crandall, Floyd M., M.D., "Abraham Jacobi, An Appreciation." *Arch. Ped.*, June, 1919.

ture in America, France, England, and Germany, and pediatric journals are multiplying and pediatric societies increasing.

First Institutions for the Care of Children

The first foundling asylum of which there is authentic record was founded in 787 by Archbishop Datheus of Milan. It was primarily for the care of illegitimate children who, heretofore, had been put to death. The Hospital of the Innocents, made famous by the Della Robbia Bambinos, was founded in Florence in 1420. (See note 5.) In 1769 the first distinct children's hospital was established in London by Dr. George Armstrong. The Kinderkranken Institute, which is still in existence, was founded in Vienna by Dr. Marstalier a few years later. (See note 6.) The early part of the nineteenth century saw the establishment of the Hôpital des Enfants by the French Republic, a children's hospital in St. Petersburg, another in Vienna, and one in Buda Pesth. The great Ormond Street Hospital for sick children was opened in London in 1854. Dr. Charles West, called the "Jacobi of England," was the promoter of this institution and its establishment was due largely to the efforts of his close friend, Charles Dickens, who by his books and in other ways has always shown himself a real benefactor to children. (See note 5.) The United States was the last country to establish children's hospitals. The first one, containing twelve beds, was opened in Philadelphia in 1855. For this reason the city has been called the pioneer pediatric city of America. Other children's hospitals were established during the next decade: Nursery and Child's in New York in 1857, a small one in Chicago in 1865, the Children's Hospital of Boston in 1869,[9] and the Thomas Wilson Sanitarium in Baltimore in 1879. The Boston Infant's Hospital was opened in 1881 and was the first hospital in this country where only sick babies were admitted. (See note 5.) The present Babies' Hospital of New York was established in 1887. Similar institutions have

[9] "A Half Century of Steady Growth and Usefulness." *Modern Hospital,* Nov., 1919.

increased rapidly in number since these early beginnings, and now they are found in nearly all the large cities.

Comparison of the Child with the Adult.

Some Differences between the Child and Adult

The child is not a miniature adult and he cannot be treated as such, even though his body has the same general structure and contains the same organs as that of the adult. The greatest contrast appears in infancy and early childhood. After seven years of age children in their diseases resemble adults more than they do infants.[10] The child is an unfinished product; his body and mind are in the process of growth and development and great changes are taking place in the different organs and tissues all the time. The relationship of the various organ systems of the body to one another shifts, and with this process the relationship of each organ system to the whole body shifts. For example, in the newborn about 23 per cent of the total weight is in muscles; in the adult about 43 per cent is in muscles. The relative weight of the infant's liver is about 2½ times that of the adult.[11] Because of the rapid growth and active changes which are taking place, the child lacks reserve vitality and his resistance is lowered. Thus he is unusually susceptible to infections, and is more easily prostrated by disease, which, because of the instability of his nervous system, is often manifested by grave symptoms. He is more quickly overcome by disease than is the adult, and he is liable to sudden and unexpected death. On the other hand, while the child's organism is less stable than the adult's, it is more plastic; he is very sensitive to outside influences, environment, etc., and responds readily to proper treatment.[12]

Children have very little chronic disease or very little disease which is evidenced by a degenerative process of one form or another. On the whole they tend to recover. Many

[10] Holt, L. Emmett, M.D., "Diseases of Infancy and Childhood."

[11] Helmholz, Henry, M.D., "The Use of Drugs in Infancy and Childhood." *Jour. Am. Med. Assn.*, Oct. 8, 1921.

[12] Campbell and Kerr, "Surgical Diseases of Children."

organic lesions which become chronic in the adult may be overcome or "outgrown" if the child's nutrition is unimpaired and if he is placed in proper hygienic surroundings.

The infant or young child cannot express himself to tell when he is ill nor is he able to describe his symptoms or sensations. Information about these can be obtained only by skillful and close observation of objective signs. The general rule is that the younger the child, the poorer is the prognosis in all diseases of childhood. It is for this reason that the mortality of the first year of life is so high and that it diminishes progressively during the remainder of childhood.

Mortality Statistics

Statistics show that of all infants born alive approximately 10 per cent die before the age of 1 year. Twenty-five per cent of these deaths occur in the first month from the following causes: congenital weakness, 50 per cent; accidents of labor, 10 per cent; pneumonia, 9 per cent; atelectasis, 8 per cent. Of the deaths of all ages 20 per cent occur under 1 year, 5 per cent between 1 and 2 years, 4 per cent between 2 and 5 years, and 3½ per cent between 5 and 15 years. The deaths under 1 year are caused chiefly by the following: gastro-intestinal and nutritional diseases, 45 per cent (diarrhea, marasmus, etc.); acute respiratory diseases, 19 per cent (pneumonia); congenital malformations, 6 per cent; infectious diseases, 5½ per cent (*1.* pertussis, *2.* diphtheria); tuberculosis and syphilis, 8 per cent. The principal causes of death in the second year occur in the following order: gastro-intestinal diseases, acute respiratory diseases, infectious diseases (measles, diphtheria, pertussis). The chief causes of death from 2 to 5 years occur in the following order: infectious diseases (diphtheria, scarlet fever, measles, pertussis), acute respiratory (tuberculosis). The chief causes of death from 5 to 15 years occur in the following order: infectious diseases (diphtheria, scarlet fever), acute respiratory. There has been considerable reduction in infant and child mortality in recent years. The most important factors for the first year of life have been better natal and prenatal care and better food and hygiene after

birth. After the first year the chief factor has been diphtheria antitoxin.[13]

Dr. Holt says: "There is no more promising field in medicine than the prevention of disease in childhood. The majority of the ailments from which children die, it is within the power of man, in great measure, to prevent. Prophylaxis should aim at the solution of two distinct problems: (1) the removal of the causes which interfere with the proper growth and development of the child, and (2) the prevention of infection. The former can come only through the education of the profession and of the general public in the fundamental principles of infant feeding and hygiene. This is a department which has received altogether too small a place in medical education. The latter must come through the profession and through legislation, the purpose of which shall be more rigid quarantine, more thorough disinfection, and improved sanitation in all departments." (See note 10.)

Pediatrics Should Be Preventive Medicine

Essential Qualifications for a Good Pediatric Nurse.

Love of Children

The first essential qualification for a good pediatric nurse is a love of children, for the child is extremely sensitive to his environment. He recognizes intuitively and responds quickly to the presence of an unsympathetic person. The nurse must be able to win not only his confidence but also that of his mother who is always loath to leave him in the care of a stranger. Often in her anxiety and ignorance she will doubt the nurse's ability to care for the child. The nurse must respect the mother's feelings and excuse her for her emotion and ignorance. She should try to imagine herself in the mother's place, about to entrust her most precious possession, her sick child, to the care of some one else, possibly a total stranger.

Knowledge of Mental and Physical Hygiene of Children

The pediatric nurse must have a desire to understand the child and she must be constantly trying to educate herself to better understand him. She must be able to adjust herself to

[13] Marriot, William McKim, M.D., Unpublished Notes for Nurses.

him and to see things from his point of view, participating in his joys, his sorrows, his work, and his play. She must be able to manage him; this ability is partly instinct and partly acquired training. It is essential for her to have special preparation in child training and in the mental development and hygiene of the child. Her education must contain also training in the physical growth and hygiene of the child and a knowledge of the child in health and disease, for she must know which diseases may affect him and how he may react to various affections.

Acute Powers of Observation

Since the infant or young child is not able to indicate his desires or to describe his symptoms and sensations, the nurse must be trained to have very acute powers of observation and must be able to recognize and to interpret the signs and symptoms which he presents. No other branch of the profession demands more exacting or more conscientious work or greater faithfulness to minute detail than pediatric nursing. If the nurse has a proper love of children together with the proper knowledge of the child's mental and physical development and hygiene, she will be able to see the necessity

Faithfulness to Detail

for the exacting detailed work that his care entails, and she will have the desire and patience to conscientiously carry it out. It has been said that "he who helps a child helps humanity with a distinctness and with an immediateness with which no other help given to human creatures at any other stage of their lives can possibly be given."

CHAPTER II

THE GROWTH AND DEVELOPMENT OF THE NORMAL CHILD

Knowledge of Growth and Development Necessary

A thorough knowledge of the normal growth and development of the child is an essential equipment for the intelligent nurse in order that she may be able to detect abnormalities and early signs of disease in children placed under her care.

Periods of Growth

The development of the child is divided into 4 definite periods of growth:

1. The term "newborn" applies until all traces of prenatal and intra-uterine life have disappeared, usually 3 to 4 weeks.

2. The term "infant" applies from 3 or 4 weeks to 2 years of age.

3. "Childhood" extends from 2 to 7 years and,

4. "Youth" from 7 years to puberty.

Average Weight of Newborn Baby

The average weight of the full term baby girl is 7 pounds or 3200 grams and that of the baby boy 7½ pounds or 3500 grams. There is an initial loss of weight during the first few days of 150 to 300 grams. The causes of this are:

1. The vernix caseosa is removed at the first bath.

2. The child begins to urinate and has defecations known as meconium.

3. He obtains very little from the mother's breasts during the first few days, never more than 5 to 10 cubic centimeters of colostrum at a nursing and very often nothing at all; he therefore burns up body tissue to maintain heat. As soon as the mother's milk comes he should begin to gain weight so that in from 10 to 14 days he will have regained his birth weight. Some babies regain their original weight in 8 days. The average baby does not usually gain weight every day but will gain from 30 to 60 grams one day and will lose part of it the next, then gain the next or remain stationary for a

Rate of Growth

day or two. For this reason it is unwise for a young mother to weigh her normal baby daily; she will save unnecessary worry if she weighs him only once a week. The healthy, normal baby will gain 150 to 200 grams every week so that in 6 months he will have doubled his birth weight; for example, if he weighed 3200 grams at birth, he should weigh 6400 grams at 6 months of age. The average gain during the second 6 months is half that of the first 6 months, or 60 to 100 grams a week. At 12 to 15 months the birth weight is trebled. The gain in weight during the second year is about 6 pounds, during the third year about 5 pounds, and during the fourth year about 4 pounds. After 4 years of age the average yearly gain is 4 to 7 pounds. It is as important that the child follow the normal rate of growth as it is for him to actually attain the given weight for his age.

Table of Weights

TABLE OF WEIGHTS[1]

Average Weight and Increase in Weight a Year for Boys and Girls

Age	Boys		Girls	
	Weight iu pounds	Increase a year in pounds	Weight in pounds	Increase a year in pounds
Birth	7.55		7.16	
6 mo.	16.00	16.90	15.50	16.68
1 yr.	20.50	9.00	19.80	8.60
2 yr.	26.20	6.00	25.50	5.70
3 yr.	31.20	4.70	30.00	4.50
4 yr.	35.00	3.80	34.00	4.00
5 yr.	41.20	4.14	39.80	3.87
6 yr. 6 mo.	45.20	4.00	43.40	3.60
7 yr. 6 mo.	49.20	4.30	47.70	4.30
8 yr. 6 mo.	54.50	5.00	52.50	4.80
9 yr. 6 mo.	59.60	5.10	57.40	4.90
10 yr. 6 mo.	65.40	5.80	62.90	5.50
11 yr. 6 mo.	70.90	5.30	69.50	6.60
12 yr. 6 mo.	76.90	6.20	78.70	9.00
13 yr. 6 mo.	84.80	7.90	88.70	10.00
14 yr. 6 mo.	95.20	10.40	98.30	9.60
15 yr. 6 mo.	107.40	12.20	106.70	8.40
16 yr. 6 mo.	121.00	13.60	112.30	5.60

Length

The average length of the newborn baby is 20 to 21 inches or 52 centimeters. During the first year the average gain is

[1] Carter, Howe and Mason, "Dietetics."

9 inches; during the second year half as much or 4½ inches; during the third year and up to 12 years, 2 or 3 inches a year.[2]

Head The average circumference of the child's head at birth is 13.9 inches or 35 centimeters. The rate of development is about 4 inches during the next 3 years. After 5 years the increase in circumference is very slow, being at the rate of about 1 inch in 5 years. The hair which the baby has at birth usually comes out during the first weeks or months and is replaced by new. There are two openings or fontanelles in the head of the newborn baby. The large or anterior fontanelle is at the junction of the two frontal or parietal bones. It should be about 1 inch in width at the end of the first year and should be entirely closed by 18 to 22 months. The small or posterior fontanelle is at the junction of the occipital and parietal bones. Normally it closes by the end of the second month.

Chest At birth the circumference of the child's chest is about ½ inch less than that of the head, i.e., if the circumference of the head is 13.9 inches or 35.5 centimeters, that of the chest is 13.4 inches or 34.2 centimeters. The circumferences of the two remain about the same during infancy. At the end of the second year the chest circumference exceeds that of the head; at the end of 5 years it is about 1 inch greater than that of the head; and at 10 years it is 5 or 6 inches greater.

Abdomen During infancy the circumference of the abdomen is about equal to that of the chest. At the end of 2 years the measurements of the head, chest, and abdomen are nearly identical. After this age the chest increases more rapidly than either of the other two.

Muscular Development The normal newborn baby will close his fingers over an object, as a rod or fingers placed in his palms, and if raised can suspend himself for an appreciable interval of time.[3] A

[2] Holt, L. Emmett, M.D., "Diseases of Infancy and Childhood."
[3] Watson, J. B., and Watson, Rosalie R., "Studies in Infant Psychology." *Scientific Monthly,* December, 1921.

baby smiles usually at 4 or 5 weeks of age. The muscular development varies greatly in different babies; the following is an average: at 2½ to 3 months he will lift his head for a short time when placed on his abdomen; he will hold his head up when carried at 4 months and will voluntarily grasp for objects at about that time; from 7 to 8 months he will sit without support for a few minutes at a time; at 9 or 10 months he will brace his legs and attempt to bear his weight on his feet; at 10 or 11 months he will pull himself up on his feet; he will change his position and begin to crawl at 9 or 10 months; at 14 to 15 months he will stand alone and begin to walk.

Special Senses

Sight

The newborn baby naturally avoids strong, bright light by closing his eyes and by contracting his pupils. Therefore his eyes should be protected from a bright, direct light. However, do not shut sunlight from the nursery, but protect the baby's eyes. A young baby of a week may follow a light with his eyes but the muscles of the eyes do not coördinate, thus causing a temporary strabismus. Fixation and coördination are established at about 3 months. A child will recognize objects at sight at 5 or 6 months, though he notices them earlier by instinct.

Hearing

The newborn baby is deaf for the first 2 or 3 days because the ear drum is collapsed at birth and hearing is not established until the middle ear fills with air. After the first few days hearing is quite acute. At 3 months the baby will turn his head in the direction from which a noise comes, and at 4 months will recognize a familiar voice.

Touch

The sense of touch is present at birth but is poorly developed except in the lips and tongue, where it is very acute. Because of this lack of sensation babies are not sensitive to heat or cold and can be easily burned without indicating discomfort. Therefore extreme care must be exercised in the use of hot water bottles and heaters around them.

Taste

Taste is highly developed from birth.

Smell

Smell is the last of the special senses to be fully developed.

Speech

The time when different children learn to talk varies greatly. Girls usually talk from 2 to 4 months earlier than boys. By the end of the first year the child will begin to pronounce simple words as "Mama" and "Papa." By the end of the second year he will put words together in short sentences, consisting of the person or object and the verb to denote action as "doggie runs." From this time on his progress is rapid. The use of words is most generally acquired in the following order: personal pronoun "me," names of persons, names of objects, verbs, adverbs, adjectives, conjunctions, prepositions, articles, and other personal pronouns. A child learns the language chiefly through imitation and repetition, therefore it is important that adults speak plainly to him. In other words avoid "baby talk."

Teeth

The formation of temporary or milk teeth begins during the second month of embryonic life. At birth all 20 deciduous teeth are completely formed under the gums and the formation of the permanent teeth has started. The following is the usual order in which the deciduous teeth appear:

2 lower central incisors	6- 9 months
4 upper incisors	8-12 months
2 lateral lower incisors	12-15 months
4 anterior molars	12-18 months
4 canines	18-24 months
4 posterior molars	24-30 months

At 1 year a child should have 6 teeth
At 1½ years a child should have 12 teeth
At 2 years a child should have 16 teeth
At 2½ years a child should have 20 teeth

Appearance of the permanent teeth is as follows:

First molars	6 years
Incisors	7- 8 years
Bicuspids	9-10 years
Canines	12-14 years
Second molars	12-15 years
Third molars	17-25 years

These permanent teeth replace the deciduous teeth. They

grow and push outward, causing atrophy of the roots of the first teeth, which consequently loosen and fall out. (See Oral Hygiene, Chapter VI.)

Temperature

The normal temperature of the newborn is 98° F. to 99° F., usually about one-half degree higher than his mother's. The heat regulating center in the brain acts imperfectly at first and slight causes are sufficient to change the temperature. It may become subnormal from apparently slight exposure, or it may become very high from some minor disturbance or from the application of external heat. Therefore great care must be taken not to expose the baby and good judgment must be used in the application of external heat. The temperature of a child of any age is always higher from similar causes than that of an adult. A child also reacts more readily to outside influences and may have an elevation of temperature from such causes as overexcitement.

The rate of the pulse and respirations of babies and children is greatly increased by a slight disturbance and always by crying. Therefore pulse and respirations should be counted when the child is very quiet, preferably when he is asleep. They should always be taken before the temperature, since the insertion of the thermometer often causes excitement enough to increase their rate temporarily.

Average Pulse Rates:

Pulso

120-140	in newborn baby
110	1st year
100	2d year
90	5-8 years
70-80	11-14 years

Average Rate of Respirations:

Respirations

35-40	newborn
24-36	1-2 months
20-32	2-6 months
20-25	1-2 years
20-23	2-6 years
18-20	6-12 years

Puberty

The boy is always slightly ahead of the girl in height, weight, and muscular development until the change from childhood to adolescence or puberty. This occurs usually in the eleventh to thirteenth year in the girl, and in the thirteenth to fifteenth in the boy. As the girl nears this age she gains more rapidly than the boy and is taller and heavier than he is for 2 or 3 years. Then the boy develops more rapidly and is soon ahead of the girl. This difference remains permanent. The approach of puberty in the girl is characterized by: (1) the gradual enlargement of the breasts, (2) the growth of pubic and axillary hair, (3) the beginning of menstruation. This function usually starts at the age of 13 or 14 years, sometimes earlier, sometimes later. It may be irregular at first, but if the child is healthy it soon becomes normal. The approach of puberty in the boy is characterized by: (1) change of voice, (2) growth of pubic and axillary hair, (3) the development of the testes.[4]

Changes which Occur during Puberty

Puberty brings about mental and psychical changes in both sexes. The epoch manifests itself in a variety of ways in different individuals.[5] Dr. Caroline Hedger has very aptly spoken of it as the "difficult age."[5] The child undergoes a complete change in disposition. He may suddenly become irritable and nervous. He may be unusually shy, awkward, self-conscious, or morbid and depressed. Besides being emotionally unstable, he may have difficulties in adjusting himself to his family and home environment, also to society. The reason for these inconsistencies is that he is experiencing new sensations and desires, before he has developed experience or judgment which will help him to understand or control these emotions.[6] It is a dangerous period because the child is laying the foundation for the spiritual, mental, and physical develop-

Dangers of Puberty

[4] Lucas, William P., M.D., "Adolescence." "Oxford Medicine," Vol. I.

[5] Hedger, Caroline, M.D., "Adolescence." *Public Health Nurse*, November, 1921.

[6] "Child Care and Child Welfare," issued by Federal Board for Vocational Education.

Hygiene of Puberty

ment of his future life, and it is essential that he come through fit to stand the stress of our modern civilization. Good habits should be established in childhood so as to decrease the difficulties at this time. The child should have his full quota of sleep every night. He should have plenty of outdoor exercise, but not enough to overfatigue him. He should eat simple, nourishing food at regular intervals. His bowels should move daily. He should continue his school work and usual light tasks unless his health is definitely below par. Above all else he needs careful and wise supervision in regard to all his activities—his manner of living, his work, his play, his choice of companions and of literature. This guidance should not be a severe restraint; it should not make the boy or girl feel a lack of freedom nor should it destroy initiative. Confidence and companionship between parent and child are to be sought. Both boys and girls must be prepared for these changes by having a knowledge of what to expect and of how to conduct and to care for themselves. They will enter the period much more calmly and they will have less nervous reaction. As soon as a child is old enough to understand or is interested enough to ask questions about sex and reproduction he should be informed by his parents. His first questions about the subject should be answered in a frank, natural way, making no mystery or secret of it. He should be told the truth from the first in a simple, dignified way and in language that he can understand. Thus, if a wholesome attitude of mind toward matters relating to sex, and if the proper respect and pure ideals are instilled in him, they will remain with him throughout his life.[7]

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CHAPTER III

HYGIENE OF INFANCY AND CHILDHOOD

Proper hygiene and regularity of habits are essential for the normal growth and development of the child. The child must be taught these principles from the first by hygienic environment and absolute regularity in every detail pertaining to his care.

Importance of Hygiene

Regularity of Habits

A special room or nursery in every home where there is a child should be set aside for his exclusive use. This room should be above the first floor and should be as large as possible, remembering that 1000 cubic feet of air space should be allowed every child; it should be reasonably quiet; it should have at least two large windows; and it should be so situated that the sun shines in a greater part of the day. A corner room with southern and eastern exposures is preferable. The importance of sunlight in the nursery cannot be overestimated. The most recent work on rickets emphasizes its value as a preventive measure.[1] A porch or balcony opening from the nursery is very desirable. The windows should be screened and provided with awnings and bars or some other protection. There should be light and dark shades and the simplest of washable curtains.

Ideal Nursery

Sunlight

The air in the nursery must be fresh. A fireplace for either coal or wood is the best aid to ventilation. It must be well guarded by a high fender or screen which cannot be removed by an active child. Ventilators in the window sash are also helpful. Direct draughts may be prevented by the use of a screen and window boards. Twice a day the baby should be taken from the nursery for fifteen minutes while the windows

Ventilation

[1] A. F. Hess, M.D., and L. J. Unger, M.D., "Cure of Infantile Rickets by Sunlight." *Journ. Am. Med. Assn.*, July 2, 1922.

Temperature are opened and the nursery aired. The temperature should be 60° F. during the day except during the bath hour when it should be 72° F. During the first few months it should be 65° F. at night. As the child grows older the temperature can be lowered gradually so that by the time he is 7 months old it may be as low as 40° F.; after he is a year old it can be that of the outside air provided it does not go below freezing and provided the child is well protected by suitable sleeping garments. (See Night Clothes.) It is better to have a current of air in the room and constant artificial heat than to have no ventilation. The temperature of the nursery should be as low as possible during the summer. An electric fan may be used in hot weather to change the air but it should not be placed so that it blows directly on the child. Since the temperature near the floor is lower than that higher up, the thermometer should be placed on a level with the baby. **Method of Heating** Most modern homes are heated by steam, hot air, or hot water. The latter is the most desirable. Wire screens over the radiators are advised as a protection for the child. In addition to the heating plant a fireplace is useful in maintaining an even temperature, besides being an aid to good ventilation. As it is necessary to have the air moist, a hygrometer may be used to test the humidity, which should be about 55 per cent.

Lighting Electricity is the best method of lighting the nursery. The shades should be adjusted so that the light is indirect. The baby should be taught from the first to sleep in a dark room at night.

Equipment One should be able to wash everything in the nursery with soap and water. The walls should be painted a soft color. Pictures may be done away with if a design of Mother Goose figures or animals is painted on the walls. The floor may be of hard wood (not highly polished) or it may be covered with linoleum. Small, light, washable rugs are allowed. The furniture should be of a simple design and painted white. It should include: [2]

[2] Smith, R. M., M.D., "The Baby's First Two Years of Life."

1. A white iron crib.
2. A bureau or chest of drawers for clothes.
3. A screen.
4. A high, large, plain table covered with oilcloth upon which to put the baby when changing or bathing him.
5. Two low chairs, one a rocker without arms.
6. A footstool.
7. A platform scale on a separate small table.
8. A nursery chair and chamber (preferably kept in the bathroom).
9. A covered white enamel pail for soiled diapers (kept in the bathroom).
10. A hamper for soiled linen (kept in the bathroom).
11. A baby pen (when he is old enough for it).
12. Small chairs and a small table (when he is old enough for them).

Bed

A good bed for the newborn baby in the home is an ordinary clothes basket painted white and with a mattress of hair or felt. (A hair pillow may be used for a mattress, but never a feather one.) The basket, which is suitable for only a few months, is changed for a white iron crib. Curled, live horse hair is the best crib mattress, but as this is quite expensive, a felt mattress may be used instead. Always cover the mattress with a rubber sheet. Never allow the child to sleep with a pillow under his head. A down or a feather pillow may be kept on the bed during the day. When the baby begins to sit up a hair pillow may be put at his back to support him. Cotton sheets, wool, or cotton and wool blankets, and a white dimity spread complete the bed clothing.

Bathroom

If possible a bathroom should adjoin the nursery. None of the baby's clothes or diapers should be washed or dried in his room. Milk formulæ or food of any kind should neither be kept nor prepared there.

All of the above details regarding the nursery and its equipment cannot be carried out in every home. Nevertheless, one should always have an ideal toward which to strive and in this case it should be to make the nursery as nearly perfect as existing conditions allow.

Visitors

One or two visitors may be permitted to see the baby during the day at a stated time. It is extremely selfish of friends and relatives to interfere with the daily routine simply to amuse themselves. The baby is not a plaything for adults or an object of show for relatives and friends; he is the most precious possession ever given to man and should, therefore, be guarded accordingly. If possible do not let any one kiss the baby; certainly never allow any one to kiss him on the mouth. This does not mean that all demonstrations of affection must be repressed; for there are other means of showing it.

Sleep

The newborn baby sleeps most of the time, waking only from hunger or discomfort. At first his sleep is deep and rather stuporous, but after the first month it is not so profound and is quiet and peaceful. After 3 years it is the deep, sound sleep of childhood. The following is a table for the minimum amount of sleep necessary for a child:

Necessary Amount of Sleep

Age	*Amount of Sleep*	*How Divided*
Newborn	20-22 hours	
6 months	16-18 hours	Staying awake ½ to 2 hours at a time.
1 year	14-15 hours	11 or 12 hours at night plus 2 or 3 hours during the day (a nap twice a day).
2 years	13-14 hours	11 or 12 hours at night plus 1 or 2 naps during day.
4 years	11-12 hours	
6-10 years	10-11 hours	
10-16 years	9 hours	

If regular habits of sleeping and feeding are established from the beginning, it will not be difficult to follow them. The newborn is fed every 4 hours during the day and 2 or 3 times at night; i.e., at 10 or 11 P.M. and at 5 or 6 A.M. The baby sleeps nearly all of the time between feedings, if he is dry, warm and comfortable. This means that his naps are 2½ to 3½ hours long except at night, when he should sleep 6 to 7 hours at a stretch. In order to establish this routine the baby must be awakened regularly for his feedings. After each feeding

change his position. If he lies on his right side after the 10 A.M. feeding, he should lie on his left side after the 2 P.M. feeding. If he cries between feedings a change of position will often quiet him. If this fails try placing him on his abdomen. A child must never be rocked to sleep, given a pacifier, or any soothing device. See that he is warm, dry, and comfortable, and place him on his bed while he is awake to allow him to go to sleep by himself.

Daily Rest Period

A daily nap should be taken until the child is old enough to go to school and, if he is suffering from malnutrition, bad posture, etc., his school hours should be so arranged that a daily nap may still be possible. It should be taken at the same hour every day, usually after lunch. His shoes and rompers should be removed and he should be made to lie on his bed. Open a window to supply plenty of fresh air and draw the shades so that sleep may be induced. If the weather permits, the child should take the nap out-of-doors on a sleeping porch. Do not allow him a strenuous play time just before going to bed because as a result he may be too nervous and exhausted to sleep or his sleep may be restless. The tendency is to crowd more activities into his life than his strength and health will permit. There is a close relationship between overfatigue and malnutrition.[3] The rest period must, therefore, be carefully guarded until the time when school interferes with it. From this time his activities must be limited to those which do not interfere with his normal gain in weight.

Malnutrition and Fatigue

Time Out of Doors

A baby may be taken outdoors for a few minutes when he is a week old if the weather is mild. If the time is gradually increased he may sleep outdoors during the entire day at the end of 2 or 3 weeks. In very cold weather it is best not to take the newborn outdoors until he is a month old and then only if the temperature is above 60° F. If the temperature is above 20° F. he may go outdoors when he is 4 or 5 months old. When he is older his naps may be taken outdoors except on

[3] Veeder, B. S., M.D., "Rôle of Fatigue in Malnutrition of Children." *Journ. Am. Med. Assn.*, Sept. 3, 1921.

windy, stormy, or extremely cold days. In other words, he should be kept outdoors just as much as the weather permits. Plenty of fresh air day and night is as necessary as food for the growing organism. Do not wheel the baby when he is outdoors but place the carriage in a sheltered spot and leave him alone. There is no necessity for wheeling him until he is too active to remain quietly in his carriage.

Crying It is very necessary for the baby to cry as soon as he is born in order to expand his lungs and to prevent atelectasis. If he does not cry he must be forced to do so 2 or 3 times daily, for under normal conditions the lungs do not expand fully for several weeks. After that crying is a valuable form of exercise and the baby should have at least 15 to 20 minutes of loud, strong crying every day. Excessive crying is generally caused by discomfort, as from soiled napkins, or by hunger, fright, anger, or habit. If a baby is crying see that he is dry, that he is neither too warm nor too cold, that his clothes do not irritate him, and that his position is comfortable. Give him his feeding if it is time for it and if he is crying from hunger he will be satisfied and will sleep afterwards. Make sure that he is not crying from pain, possibly from sore buttocks or from difficult stool. If he has colic he will kick his legs and draw his knees up over his abdomen and his cry will be loud and paroxysmal. If he is crying from fright, comfort him; but if he is crying from habit or temper or because he is spoiled, start disciplining him at once.

Exercise Exercise is necessary for the child's development. The small baby exercises with every motion he makes with his arms and legs and when he cries. The baby's daily routine in a home should include a special exercise time. The room should be warmed to 72° F. (as for the bath) and the baby should be placed on his bed, dressed only in his shirt and diaper. (See note 2.) He should be permitted to kick and exercise in this way for 20 to 30 minutes. During the summer he may have his exercise outdoors. This is not a practical suggestion for an institution because it takes too much time. The small baby

may also obtain exercise if he is held or carried once a day. He ought never to be rocked and should be handled only for a few minutes at regular intervals; usually the best time is before feeding him or before putting him to bed. Be sure that his head and neck are well supported when he is being held. Intelligent mothering is essential for every baby's normal development, but care must be taken that it does not become foolish indulgence. As a rule the baby in the home is held too much and the baby in the institution is not held enough. The latter needs a certain amount of mothering to prevent him from becoming "institutionalized"; therefore special effort should be made to pick him up and hold him occasionally. As a child develops, his body is in constant motion when he is awake and he has sufficient exercise from his normal play. His motions should not be restricted by too tight clothing about his feet. There are many walkers, rocking horses, and swings on the market and, if they are used, care must be taken that they are the correct size and constructed so that their continued use will not cause deformity, also that they are used in moderation. Such devices must be made of plain enameled wood with no cushions or upholstering. A baby exercise pen is useful after the child begins to crawl about. This is best built on a standard or with legs long enough so that the floor of the pen is at least 12 inches from the floor of the room to prevent draughts from reaching the child. He should never be allowed to play on the floor because of draughts and dirt. Exercise should be taken outdoors when the weather permits. All outdoor sports should be encouraged. The child should be permitted to indulge to the point of moderate muscular fatigue, but not to exhaustion.

Intelligent Mothering

Exercise Pen

Posture must be carefully watched because incorrect posture limits the activities of the growing boy or girl and prevents the well-rounded exercise which is necessary for growth and development.[4] Correct posture is: head up, chest up, shoul-

Posture

[4] Dickson, F. D., M.D., "Effect of Posture on Health of the Child." *Journ. Am. Med. Assn.*, Sept. 3, 1921.

ders up, abdomen in, legs straight, and feet forward. If efforts are made to see that the child assumes proper postures early in life, sitting and standing, much trouble may be prevented. Ill-fitting clothing may cause and certainly will aggravate postural defects; the weight of the clothes should come from the shoulders and they should be made so that their weight is evenly distributed.[5] Mild postural defects may be corrected by proper exercise and periods of rest as prescribed by a specialist.

Play Toys

As soon as a child is old enough to notice his fingers and to try to hold objects in them (usually about 6 months), he demands something to play with. Since he will put everything into his mouth, his toys should be made of a material which can be washed or preferably boiled. Wooden, rubber, or celluloid toys are best; woolen ones are prohibited. They should be durable, well made, in good taste as to color, and should have no sharp corners, rough edges, or long handles to hurt the child. Allow him only one toy at a time, since he will be as happy with one as with many, and one will help develop his powers of concentration while several will confuse him. If he throws his toy on the floor, it may be tied to his crib with a piece of tape. Do not allow a child of any age to play with money.

Purpose of Play

The purpose of play is not primarily to give pleasure, although this should not be lost sight of, but to afford opportunities for development, to act as a character builder and an assistant to education, to furnish a wholesome stimulus for the development of creative instincts, and to supply an outlet for mental, physical, and emotional powers. Playthings should be selected with the above points in mind.[6] No child will be happy or contented without occupation; therefore a place to play and suitable toys for both indoors and outdoors are necessary. These do not need to be elaborate or expensive, for simple, homemade contrivances often give more pleasure

[5] Ramsay, W. R., M.D., "Care and Feeding of Children."

[6] Scott, Miriam Finn, "New Riches of Play." *Good Housekeeping*, Dec., 1921.

than do the former. (See note 6.) Constructive, meaningful toys which bring out the child's ingenuity, develop his imaginative and creative powers, and produce a desire to concentrate and persist in the task on hand are advisable. Supply him with material and encourage him to invent and construct things for himself.[7] Teach him to always keep his possessions in a neat, orderly way and in a place specially provided for them.

(Daily toilet habits discussed in Chapter XV, Urine and Stools in Infancy and Childhood.)

Clothing

A baby's clothes should be light, soft, non-irritating, well-fitting but not too tight, and warm enough to suit changing conditions of climate and season. A baby's hands and feet should be warm but he should not perspire. Dresses and petticoats should hang from the shoulders with no extra seams or fancy trimming. They should be fastened with tapes or very small buttons, as few pins used as possible, for the "well dressed" baby has pins only in his diaper.

Clothes for Newborn

Clothes for the newborn consist of a dress, "gertrude," shirt, abdominal binder, and diapers.

Abdominal Binder

The abdominal binder which secures the cord dressing may be made of light, part-woolen flannel or old, soft, cotton cloth. It should not be hemmed and should be cut 4 inches by 15 inches. The band is preferably basted, but may be pinned with very small safety pins to one side of the front midline. It is put on tightly to keep it in place but not tightly enough to interfere with respirations or to cause discomfort. If it is drawn very tightly around the abdomen and the finger slipped under it while it is basted or pinned, it will be just snug enough when the finger is withdrawn. The binder is not worn after the umbilicus is healed.

Shirt

An all-woolen shirt is too irritating for a baby's skin; cotton and wool or silk and wool is better. Plain cotton shirts are warm enough when the nursery can be kept at an even temperature and if the baby's temperature does not become subnormal. The second size is the most practical as the first size

[7] Czerny, "Der Arzt als Erzieher des Kindes."

is outgrown very soon. Garments containing wool require special laundering. Use Ivory soap and warm soft water (hard water softened with pure borax). Wash by squeezing the articles with the hands, not by rubbing on a wash board. Rinse several times in warm water and hang outside to dry.

To Launder Woolen Garments

Diapers

Bird's-eye cotton is most desirable for diapers because it is light and absorbent. Several thicknesses of cheesecloth may also be used. Small size diapers (18 inches by 36 inches) are best for the newborn and larger ones (26 inches by 52 inches) for older children. The meconium of a newborn is very difficult to wash from diapers; therefore it is advantageous to put a piece of old cotton, 3 to 5 inches square, inside the diaper. This can be done for older children also. For the small baby the diaper may be folded in the shape of a triangle and two corners of the triangle brought around the waist and the third corner brought up between the legs. The three ends or corners are then pinned together to the shirt in front. The diaper may also be pinned to the shirt in back to keep it in place. A better way to adjust the diaper when the child is older is to fold it in the middle lengthwise, so that it is about 10 or 12 inches wide and 24 inches long, bring half of it up between the baby's legs in front and half in back, draw it firmly around his waist and pin at either side with two safety pins. Do not adjust the diaper too tightly, especially over the genitals, because it may cause irritation and lead to masturbation. Too many thicknesses should not be brought up between the legs. When the child is older two diapers (one inside the other) may be necessary to absorb the moisture. Rubber pants are undesirable because the rubber keeps in all the moisture and irritates the child's sensitive skin. They are permitted occasionally, when traveling or on similar occasions. Change the diapers as soon as the child urinates. Always wash them before using again. All fecal material should be washed off at once. Wet and soiled diapers should be placed in a covered, enamel pail until they are washed. Clothing should never be washed or dried in the nursery. Diapers should be washed

Rubber Pants

carefully to prevent red, excoriated buttocks. Use a good grade of soap such as Ivory; avoid the use of soda or strong washing powders. If the water is hard, soften it with pure borax. Rinse thoroughly and hang in the sun to dry. **To Launder Diapers**

"Gertrude" The "gertrude" or petticoat is made of light-weight, part-woolen flannel, outing flannel, or cotton. It should measure 27 inches from the shoulder to the hem and should be fastened at the shoulder with tiny buttons or tapes.

Dress The slip should be made of a fine, soft cotton material, as batiste or nainsook; it should be extremely simple with sleeves (Bishop sleeves) cut with the body of the dress. Hand work or embroidery is allowable but not necessary. It should fasten in the back with 2 or 3 tapes. If a tape is run in a small hem at the neck and at the bottom of the sleeves the slip will fit better.

Night Clothes The newborn can sleep at night in the clothes worn during the day. His outside wraps consist of a cape with hood attached or a sleeping bag with hood.

Clothes for Infant The same style shirt, as given above, in proper sizes, can be worn throughout infancy, provided that a normal temperature is maintained. As the child grows older and sleeps in a colder room, he must wear a sleeping garment which will protect him even if he kicks the covers off. A nightgown with draw-strings in the bottom of the sleeves and in the hem of the gown is best for the first few months. A sleeping bag is also satisfactory. It should not be made too large but large enough to allow perfect freedom. When the child outgrows these, make him a sleeping garment with feet. If a shirt is worn at night a different one should be worn during the day. A child over a year does not need a shirt at night except in cold weather; when he may wear a cap and mittens as well, especially if he sleeps outdoors. Clothes may be shortened to ankle length when the baby is 3 or 4 months old. The diaper is worn until the child is trained, then bloomers, drawers, or gauze union suits. The "gertrude" is a suitable petticoat for all ages. A plain petticoat buttoning to an underwaist at

the waistline is also good. Simple, dainty dresses are best; laces, frills, and tucks should be avoided as much as possible. A quilted bib is quite necessary to absorb excess saliva when the baby drools. Rompers may be worn as soon as the infant begins to crawl about. The infant should wear cotton stockings after the first two weeks or, if necessary, stockings of cotton and wool, then his feet are not encumbered by too heavy clothing and he is free to move around as much as he pleases. The stockings are pinned to the diaper in front and in back. Later they may be attached to an underwaist by garters. No shoes are needed until the baby crawls, when he should wear soft-soled ones. These should be replaced by stiff-soled shoes when he begins to stand.

In Hot Weather

A young infant should wear as few clothes as possible during hot weather; a sleeveless gauze shirt and diaper only are necessary. It is advisable always to keep the abdomen covered. The temperature should regulate the amount and quality of the clothing. Do not overdress the child as is the general tendency; be consistent and dress him according to the temperature, seeing that all parts of the body are protected. For example, if the room is kept at an even, warm temperature, the child may wear the same clothing in winter that he wears during the summer, extra heavy wraps being added when he goes outdoors. Then, too, do not put a warm coat with a fur collar on the child and at the same time have his knees exposed by the use of socks instead of stockings. The outdoor clothing should consist of a coat sufficiently heavy to keep him warm but not heavy enough to restrict freedom of motion. Woolen overstockings or leggings, overshoes or rubbers, mittens, and a knitted cap are good suggestions.

Clothes for Child

The same rule for woolen clothes applies to the child over 2 years. A union suit may be worn if desired. Drawers should have long, ankle-length legs in winter. An underwaist must be worn with drawers, the petticoat and garters being buttoned to it at the waistline. This underwaist holds the

weight of the other garments and should be made with broad shoulder straps so that the weight is equal upon all points. Both boys and girls may wear rompers for play suits until at least 5 years old. After that age a boy's play suit may consist of overalls while a girl may wear a dress with bloomers to match, thus making a petticoat unnecessary. Short stockings are permissible only in warm weather. A child should wear shoes sufficiently large and comfortable, which conform to the natural shape of the foot. Shoes without heels should be worn until the boy or girl is 5 or 6 years old, and after that shoes with very low heels.

The Bath

The child in the home is bathed daily, following the same routine for the bath as given under the care of the child in the hospital (Chapter VI). The necessary equipment is:

Equipment

1. Jar of cotton pledgets made of second grade cotton (size of walnut). A covered glass fruit jar may be used.
2. Jar of cotton eye pledgets made of best grade cotton (size of small marble).
3. Jar of toothpick applicators made of best grade cotton wound tightly on small end of toothpick.
4. Two small glasses or enamel basins, 4 inches in diameter, one for oil and one for boric acid.
5. One large basin to be filled with hot water in which to put small basins to heat contents.
6. One cake pure castile soap (powdered or liquid soap is not necessary when caring for only one child).
7. Paper bag for waste.
8. Bath thermometer.
9. One shaker of zinc stearate or boric powder.
10. Nail scissors, file, orange-wood stick.
11. Brush and comb.
12. Tray of safety pins.
13. One bottle of oil.
14. One bottle of boric acid solution—2 per cent. (Make a 2 per cent boric acid solution out of sterile water and put it in bottle to use as needed.)
15. Wash cloth and towel. (Old pieces of soft linen make very good ones for the small baby. Bird's-eye linen is also good material.)

All articles used for the child's bath in the home should be kept for his exclusive use. They do not need to be sterilized but should be well washed after use. Cotton pledgets, applicators, and solutions do not need to be sterilized. Handling forceps are not necessary. No highly scented soaps or powders are permitted.

Temperature of Bathroom

The temperature of the bathroom should be 72° F. A kitchen table covered with oilcloth can be kept in the bathroom. This makes a convenient place on which to put the baby when bathing him as well as when changing his diapers, etc. There are on the market folding bath tables with canvas tops which take up less room.

The newborn baby in the home is oiled, as he is in the hospital, until his cord comes off and the umbilicus is healed. After that time a tub or shower bath may be given, as the facilities of the bathroom permit. For the tub bath of the small baby a basin or a small enamel foot tub will do. The folding rubber tubs which are on the market are very convenient. A shower may be improvised by attaching a spray to the faucet of the bath tub.

Temperature of Water

The temperature of the water should be 100° F. for the first 6 months. After that it may be gradually lowered until it is between 95° and 90° F. by the time the child is a year old. After he is 6 months old the healthy infant may have his bath followed by a shower of water 80° F. to 70° F. for 15 or 30 seconds. This is followed by a brisk rubbing of the entire body.

Time for Bath

The small baby's bath is best given in the morning before his 10 A.M. feeding. The older child may have a cold sponge or shower in the morning and his warm tub bath at night.

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CHAPTER IV

THE MENTAL DEVELOPMENT OF CHILD LIFE

By Frederica Beard

Every nurse who has the care of children will do greater service to humanity if she be intelligent—rather than ignorant—in regard to the growth, mental and physical, of the human beings for which she cares. Her problems in this work will be also more readily solved and thereby her burdens grow lighter.

By "mental" we mean all of human nature that is not body. One is apt to think simply of the intellect under the term mental, reserving that which relates to feeling, emotion, and will to the so-called "soul" or "spirit." But modern psychology sees but different phases of one all—a unit of consciousness expressing itself in three great activities. "'Intellect' is not a part of the soul but the whole soul, predominantly engaged in thinking; 'sensibility' is not a part of the soul capable only of feeling, but the whole soul predominantly engaged in feeling. 'Will' is not some part of the soul capable of choosing, but the whole soul engaged predominantly in choosing."[1]

The proper usage of the word "mind" suggests a static entity, whereas mental development implies process—an unfolding. To speak of "mental states" is in a measure misleading, because there is nothing fixed, nothing passive, but rather a continuous activity of growing experiences.

Capacities and innate tendencies are the only mental en-

[1] Jones, L. H., "Education as Growth," page 28.

dowments—capacity to feel, capacity to act, capacity to think, and capacity to choose; innate tendencies leading to response to certain conditions that serve as stimuli. These capacities and tendencies may or may not develop.

Unfolding means enlargement *from within out*, and consequently *change*. This is the law of growth in all forms of life from the lowest to the highest. Human development may well be compared to that of plant seed. In both, growth is gradual. If a gardener hastens growth, lack of beauty or of strength is the result. Change comes often imperceptibly. There is, we say, a sudden bursting forth, but an invisible change has been going on, and growth means more than difference in size. Growth is progressive and orderly. "First the blade, then the ear, and after that the full corn in the ear." The greatest of teachers has also said, "Consider the lilies of the field, how they grow." Commenting on this, Henry Drummond says, "There is but one principle of growth for the natural and the spiritual, for animal and plant, for body and soul." The caretaker of the garden makes right conditions for germination and fruitage, and that in its widest sense covers the work of the gardener of any human life. A leading psychologist (see note 1) tells us that to educate is to cause change. Remembering the derivation of the word education—a leading out—we must not confine it to the artificial environment we call "school," but think of it as caused by all that forms a part of the environment of the developing being—home and the persons within it; natural and social surroundings which, of course, include school and all other cultural means.

"As the plant grows *through its own vital power* so also must human power become great through its own exercise and effort," (Froebel). Professor Edward Thorndike (see note 1) says: "But to say that 'Everything is in the child, and education has only to draw it out' is as true—and as false—as 'Everything is outside the child and education has only to put it in.'" Plant and child are self-active, but they absorb from the environment and in that sense are dependent

upon it. In the process of absorption, however, there is selection. Next, they project themselves into the environment and later, aggressively, gain control over it.

In the new science of child psychology it has been found that there are periods or stages in human development in each of which certain tendencies and interests manifest themselves more strongly than before or after. To study child life through one's own observations and those of specialists who have observed hundreds of children, at these different stages, is most essential for intelligent training and wise management.

To know what to expect at a certain period, how to make use of an interest, how to conserve one tendency and let another *die out;* to know that some characteristics are *transitory* and peculiar to a period and that others should be permanent—are all possibilities to-day as never before. To discriminate between original or innate tendencies and those that are acquired through training to habitual exercise, will lead to the recognition of what is universal in child life and what is peculiar to an individual.

It is remarkable to find at one period, say, from six to nine years, some one interest evident in all children everywhere; such an interest expresses itself in various ways under vastly differing social conditions. Think, for instance, of the interest from three to six years—in play that makes one object serve for another according to the imagination of the child: a bundle of rags is "dolly," father's cane is a hobby horse, a lump of mud is a "pie"; of the constructive interest from six to twelve years, when to make a real thing is a child's delight; or of the collecting interest which begins at seven or eight years in gathering rubbish, and is at its height at ten to twelve years in stamps, postal cards, and other collections of value.

In considering periods of development it is necessary to remember three things:

Age limitations are convenient but not absolute (see note 1): a child of five may belong to the seven-year-old group, while a seven-year-old may be in the five-year-old stage. Students

of childhood make slight variations in these somewhat arbitrary age limits, some dealing with the periods more broadly and with fewer variations than others. Suffice it to say here that there is remarkable agreement as to the main characteristics of each period.[2]

Difference in mental powers at varying ages is one of degree rather than of kind.[3] When it is said that the period under six years is a period of impulses, it is *not* meant that impulsive action does not occur later; nor in saying that reasoning and reflection belong to the period of the teens does it mean that a little child does not exercise a degree of reasoning power, but that each of these is most prominent in the period specified. In a study of "How to Think," John Dewey says, "The little child generalizes as truly as the adolescent or adult, even though he does not arrive at the same generalities." Generalization means capacity for relating new experiences to old ones. An idea that comprehends and unites what was isolated, involves seeing relations through comparison and judgment. A little child can do this only in concrete situations and in small ways.

It is also essential, in studying periods, to recognize that what is true of nine children out of ten forms a norm or standard for understanding child life; the tenth child is simply a variation therefrom.[4] Universal likenesses under the general laws of development are greater than individual differences, yet the latter must always be reckoned with. These differences are determined by climatic, racial, social, and special educational environment. The immediate experiences of a child form the basis on which to lead him to larger ones. It is wise to make use of that which he is in touch with, rather than to go far afield for subjects by which to enlarge experience. A geographic illustration will make clear the effect of a particular environment—a child of a fishing village has a

[2] Cabot, E. L., "Seven Ages of Children," Introduction, pp. xxv-xxvi.

[3] Cabot, E. L., "Seven Ages of Children." pp. 115-117.

[4] Welton, J., "Psychology of Education," page 71.

very different viewpoint from a child of a mining town. Walt Whitman's poem beautifully suggests this effect, and shows also how a young child selects and absorbs from what is about him:

There was a child, went forth every day,
And the first object he looked upon, and received with wonder, pity,
    love or dread,
That object he became.
And that object became part of him for the day, or a certain part
    of the day, or for
Many years, or stretching cycles of years.
The early lilacs became part of this child,
And grass, and white and red morning glories and white and red
    clover, and the song of the phœbe bird,
And the third month lambs and the sow's pink-faint litter,
And the mare's foal and the cow's calf,
And the noisy brood of the barnyard, or by the mire of the pond side
And the fish suspending themselves so curiously below there—and
    the beautiful curious liquid,
And the water plants with their graceful flat heads—all became part
    of him.

Child Life from 1 to 6 Years.

This poem brings us to the young child's love of nature and to his interest in his immediate environment. His home and that which closely relates to it is his world. His ideals—so far as he has any—center in father and mother, or those with whom he comes in daily contact. He dwells in the present, with little time or historic sense. This period has been called the play or occupation period, because the child plays for the sake of playing. He has no definite purpose in view. The above poem suggests also that sense impressions are the most permanent. These develop before other mental powers. The sense of sight should be appealed to more than the sense of hearing at this age. Things ought to have a larger place than words.

If space allowed it would be wise to divide this period into two, that of infancy from one to three years, and that of early

childhood, from three to six years. Here we must consider broadly and briefly.

A child's actions are now governed by instinct. "An instinct is a propensity prior to experience and independent of instruction" (Paley), such as fear, anger, self-assertion, parental love. Some psychologists to-day limit instinct to that which involves muscular action. To them instincts of love and of hate are more correctly innate tendencies, popularly termed feelings. Emotions are the manifestations of feelings. We often say we do a thing instinctively. That means there is a certain tendency within us that makes us act that way, for example, to run or jump when frightened.

The study of instincts shows that some are desirable, some are undesirable; under guidance good instincts may be conserved and strengthened; while others may die out from lack of use. Some instincts mature gradually, others appear late in child development. Again, some instincts are the foundation of future intelligent action. If these do not lead to action in the growing stages, any later attempt to evoke them is likely to fail. A child who has not been encouraged to express his altruistic instincts in deeds of kindness, is likely, when a man, to have no sympathetic emotions strong enough to call forth effort for others (See note 4). To cultivate right feelings during this period is most important. Self-interest, however, precedes interest in others. A child must realize "mine" before he can appreciate "thine." It is well to emphasize the sense of possession by "my chair," "my doll," and so on, and not to expect the unselfishness that a much older child should be led to exercise. Ownership must come before a child can recognize the rights of ownership.

We have seen that self-activity is a necessity for growth. It expresses itself in a variety of ways. To be busy at something—that is, to be self-active—is a primary instinct. But desire to do things may die, or it may turn to destructive acts, or it may develop into a habit of helpfulness. Froebel says, "You can here at one blow destroy, at least for a long time,

the instinct of formative activity in your child, if you repel his help as childish, useless, of little avail or even as a hindrance." "Let *me* do it," the child cries, and again "See me; I 'kin' do it." To do *for* our children rather than let them do, will often prove easier, but we lose much for them, and for ourselves, in after days. A child of this age investigates and tests—projecting himself into his environment; that is how he comes to understand himself and it. Investigation may degenerate into destruction if provision is not made for rightful exercise of this tendency. Playthings are needed that may be opened and taken apart without harm and destruction. Curiosity is mental appetite and interest is appetite satisfied. "What is it?" is a natural demand. A nurse will find large opportunity for making use of the sense of possession, also for discriminating in the play objects with which she may amuse a small patient.

Play is the life of a little child. The last twenty years have revealed the educational possibilities of play as never before. But what is play? Running, jumping, using sand, and blocks? It may be one or all of these, but there may be play without any of them, or any similar things. It is just the joyous expression in any interest that occupies the moment, without thought of a result from such occupation. Doing anything for a result signifies work. The very young child builds and knocks down—testing materials and qualities together with his own ability through play, finding what this thing will do and that will not, without, of course, deliberate or even conscious purpose. The older child builds and makes a house —often using it in his play, thus showing a definite purpose working for a result *through* play.

It has already been said that our point of contact is through a child's immediate experience. It follows then that we must share the playful spirit; also, that we must use the positive rather than the negative from out the environment; the beautiful and good will bring a spirit of joy, while to dwell in words on the undesirable and bad destroys the play spirit. An

excellent rule in the management of little children is this: Do not introduce evil of which they know nothing. A mother told her four-year-old not to go across the street to the blacksmith's. He had not thought of doing so, but immediately went when Mother was not looking. A man interested in the presentation of bird life talked to first-grade children about not robbing birds' eggs from nests. These little ones had been so much interested in bird mothers and their babies, they had never thought of doing such a thing! "Don't" has its place when a wrong act has been done, or we *know* a child is tempted to do it.

If what is lovely is in the environment it will be personified, or *vice versa.* An objective imagination holds sway. Inanimate objects are clothed with life. Spirit rather than form attracts; what a person or thing can do rather than what he or it looks like; so the moon is the beautiful "lady"; the sunbeam "the birdie on the wall"; the wood-nymphs are "really in the forest," a bed-post is clothed as "dear dolly." To personify in this way is a strong interest, but imitation of doings rather than of doer is noticeable at this time. A child is full of faith and the unreal becomes the real; a poetic and spiritualizing element enters his imagination. The word spiritual is not used here in its highest sense, but in relation to life and in contrast to mere material interest—a thing is given life—a spirit—in imagination. A child always thinks in terms of the human. When he portrays Deity and the angels they appear as men. Imaginary, invisible companions are quite common; such "fancies" should be treated with sympathetic consideration by those guiding young children.

The instinct of fear manifests itself strongly during this period, due partly to a lively imagination, partly to inexperience. Fear has its value. It is implanted in every human spirit for some purpose. It is a safeguard from danger. It is the foundation stone of respect and reverence. Distinction needs to be made between normal and abnormal fear. Extreme fears often come from abnormal circumstances. A

child's fear of darkness may be overcome by suggestion of its beneficial character—the restful quiet that comes to flowers, birds, and children when the glaring light is gone. A story is told of a little girl terrified by a crashing thunderstorm. She loved singing, and to soothe and comfort her, her mother sang out into the strange voice of the storm, "O all ye thunders and lightnings, praise ye the Lord, Bless Him and magnify him forever." "The listening child heard a stronger voice than that of thunder. She lighted with joy over 'our new song,' the Psalm of David, four thousand years ago!" A nurse may follow the same principles of diversion and emphasis on the beautiful side rather than the terrible, with a frightened child. The particular method to be used must depend on the particular condition.

We have but touched on the interest and characteristics of this period and hinted at its needs. A more detailed study, with careful observation of children, will give greater insight of all three.

Child Life from 6 to 10 Years.

Worth-while instincts and impulses must now be transformed into habits. Constant reaction in the right direction strengthens mental control and establishes moral conduct. This stage of development is essentially the habit-forming period. Some habitual action begins in the earlier period (physical habits particularly), but much is not then possible. Tendencies crop out now that are to be permanent by constant reaction, or to be overcome by habitual response in another direction.

Self is very aggressive and all-absorbing. It is indifferent to social claims. It seeks self-advantage and is often revengeful. This is the period of self-directed physical activity. Earlier activity is largely aimless, but now there is purpose in view; for example, the younger child runs, the older one runs a race. Collecting—a gathering to oneself is a prominent interest; through this collecting grows differentiation along

both intellectual and moral lines. A beginning of scientific interest is evident in two ways: collecting things, useful and useless, and a frequent questioning as to "how" as well as "what."

The boy of seven to ten is not spiritistic; his interest is materialistic. Objective imagination has become constructive; he has ends in view of a concrete nature. His plans for construction are often too large for attainment. Symbolic interest is not in the spiritual symbol but in the sign. Words and marks stand for everything; the *first* reader is loved; the mere copying of numerals is a delight; honor rolls, badges, etc., are a significant interest in relation to moral valuations. Imagination is now keenly realistic. We have seen that the younger child gives life to the inanimate; rarely does a child of eight years. He responds to the dramatic story of realistic wonder and material setting, but cares little for fairy stories interesting to his little brother. This child has little care for the refinements of life; the cave and the tent satisfy. He is lore-ignoring, except as lore is vested in a person. External authority is necessary to the growth of valuations. A habit of obedience is a basis for control of self; also a habit of order and a fulfillment of regulations.

Is some one asking how will this knowledge aid me in my daily work? The following illustrations will answer this question and should lead the student nurse to make applications for herself in other parts of this study.

A nurse who knows the tendencies and interests of a child of eight and contrasts these with those of the four- and five-year-old, or again, with those of the eleven-year-old, will treat each one differently, when he is ill and when he is convalescing. For example, she will soothe the youngest by a little imaginary play. A kindergartner was traveling one evening; a young mother and a sleepy but willful child of three were near her in the "Pullman"; the mother vainly tried to quiet her little one; presently the kindergartner suggested putting "the family of fingers" to bed, and while she played "Go to

sleep my thumbkin,'' the child became happy and was ready to be undressed.

If an eight-year-old is restless because he must stay in bed, an improvised badge of honor for him who acquiesces to requirements will be likely to satisfy for at least one day. A group of pictures that may be cut out and classified, perhaps as ''flower pictures,'' ''animal pictures,'' ''engine pictures,'' etc., will appeal to the collecting interest of this child, while the younger one will be content to look at a scrapbook of heterogeneous pictures. The latter will like to investigate anything that will open and shut, and play for an hour, it may be, with trinkets from a box. The older child will find satisfaction in being shown how to *make* a box, an envelope, a pinwheel, etc., out of a piece of paper. He will be interested in a story of real doings, especially if they are wonderful to him; the fable in which animals talk, and the fairy story of similar type will appeal to his little brother.

Repetition is a natural interest; of his own notion a child goes over and over a play or a piece of work that becomes play through his interest in it. This tendency allows of intellectual and moral ''set.'' Demands made upon a child of six to ten years of age show him the requirements and expectations of the group in which he is becoming a person. Moral habits established by external authority gradually raise an individual standard.

''The Person as a Self'' is an interesting study, as Professor Baldwin presents it.[5] ''Personality is a progressive, never-to-be-exhausted thing,'' of slow growth; in earliest years the individual is not a person in the sense of definitely recognizing himself as such. There is first ''the receptive self'' and, second, ''the aggressive self,'' then follows the rise of the ethical sense in recognition of ''my ought,'' which Professor Baldwin names ''a dominating self.'' Without setting strict age limits, the first years of school life are indicated as *the* time when this dawning ethical sense may be *educated* to

[5] Baldwin, James, ''Social and Ethical Interpretations,'' page 33 *et al.*

become strong or to be left in its weakness. "Before we pass from the family circle to the school socius, before the boy gets out of his early imitative stage, we find another incident of his growth which is to him of untold importanee. I refer to the rise and development of the ethical sense." This ethieal sense develops in succeeding years until eonscienee is manifest. Suppose a boy, suggests Professor Baldwin, who has onee obeyed the command to let an apple alone, confronts the apple again, when no one is present to make him obey. His private, greedy, habitual self eyes the apple; there is also the suggestible, aeeommodating, imitative self over against it, prompting to do as his father said and let the apple alone; and there is—or would be, if obedience had taught him, no new thought of self—the quick vietory of the former. But now a lesson has been learned. A thought arises of one who obeys, who has no struggle in carrying out the behests of his father. This may be vague; his habit may be yet weak in the absence of persons and penalties, but it is there. It carries all the struggle of the first obedienee, all the painful protests of the private, greedy self. While he hesitates, it is now not merely the balance of the old forces; it is the sense of the new better obedient self hovering before him. A few such fights and he realizes the presenee of something in him which represents his father, mother, or, in general, the law-giving personality.

If habitual acts become so customary that no effort is called forth, no strμggle demanded, the final outcome will be intellectual and moral weakness. Repetitions are deadening unless they lead to discovery—it may be of self-power, it may be of truth in relation to oneself and others, or of the world in which we live. Appreciation must come through a progressive mental insight. The self needs opportunity to choose and to realize consequences of obedienee and disobedience, reverence and disrespect, rights of ownership and stealing, truth and lying. After many social experiences the "ought" grows out of the "must." According to Aristotle, practice is itself one

of the sources of insight. If a child does a certain thing many times and every time a satisfying result follows, he not only finds out what is best, but he discerns the standard of those around him and chooses to act in accordance therewith when left to himself.

Child Life from 10 to 13 Years.

The third period illustrates the continuity of growth; it proves to be a natural result of the preceding period and a beginning in certain directions of the marked changes of the fourth. Its most prominent characteristic is self-assertion. It is an era of will-training. Individuality is increasingly evident. Several contrasting types of girls and boys come before us, but these are more closely related than at first seems true; there is *some* universal background.

Sex differences also appear, but many so-called "differences" are found to have the same root instinct and interest; girls may express in milder form that which is strongly emphasized in boys. Joseph Lee characterizes all boys of this age as "Big Injuns" and all girls as "less so." The fighting tendency, evident now as never before nor after, illustrates this. Girls do not usually have a "rough and tumble," but they fight in other ways to come out "on top." There is the desire to exert power, to assert oneself, to be a leader. Fighting is not always in the interest of self-preservation, but from motives of justice and altruism in an embryonic stage. Courage and gentlemanliness, respect for oneself and others, are often the result of this tendency. "Crush it and you have a coward; if you let it grow wild, you have a bully; if you train it, you will have a strong, self-controlled man of will." Actual participation in manual labor will absorb energy that often runs to waste in fighting. Games of this age show contest and combat and the individualistic element. Even in group games, each man plays for himself and the type of game demands a leader or "captain." Group interest is just beginning, and at twelve to thirteen we find the "gang"

and the "bunch." This gradual merging of the individualistic into the social interest is a large and important study that can be only touched on here. Interest in heroes stands out, especially in those of physical prowess. "A symptom of the presence in the Big Injun of the coming spirit of membership, and perhaps the most important to be recognized of all his traits, for those whose business it is to deal with him, is his unlimited capacity for hero-worship. He cannot as yet be loyal to a social group, but he can adore an ideal if presented in the concrete form of human personality.[6]

Life is intense to our boy and girl and stories of wonderful exploits are eagerly devoured. By the testimony of thousands of children, reading is the chosen occupation of their free hours. This is the period of striking biographies. Interest is in persons more than things, and in journeying to the outside of the world. Persons are imitated or mimicked according to likes or dislikes. Deeds of daring charm are eagerly participated in. Desire for adventure is keen. The outside world appeals; love of nature is strong.

What, how, and why, in relation to concrete affairs (for instance, mechanics) are evident. The question "*Why must* I do it?" shows a seeking after reasons in the struggle to adjust one's will to another's. Choice of action should have a larger place in training now, with always an inevitable consequence following; the impersonal law is apt to be recognized and accepted more readily than the arbitrary personal demand.

Constructive imagination leads to more exact planning and more definite fulfillment than before. The making of real things, that can be actually put to use, satisfies. Encouragement is needed for the completion of such undertakings. Cooperative service will lead to a greater social interest; self-absorption and importance pass into thought for others, through working for them. Wise consideration is needed here, however, for ambition to earn money is characteristic of this

[6] Lee, Joseph, "Play in Education," page 324.

age and dislike to sharing in home responsibilities is often manifest. Ella Lyman Cabot gives excellent illustrations on this subject and wisely says, "Give both the instinct of earning and the instinct of spontaneous kindness free play at the same time. For example, do not pay for running upstairs for a handkerchief or carrying a message. Pay rather for work by the hour or job. To pay for *not* doing a mean or disliked thing seems to be bribery; to pay for unneeded, devised work is pauperism. Pay must be something needed, something of market or individual value, and at standard rates" (See note 3). To reward moral conduct with money is to do a moral injury.

To sum up this brief outline, one may say this is a period of contradictions, of strikingly good and bad traits, terminating, as it does, in what has been called the paradoxical age.

Child Life from 13 to 16 Years.

The early teens have been beautifully termed adolescent—that is, a flowering period. The mental and moral change and unrest of this time correspond to the physical change. Because of the often peculiar and puzzling character of the period, with its contrasts of good and bad qualities, it has been termed paradoxical and critical. It is so large a study we can but touch the edge of it.

In the first part of the period a physical awkwardness makes a young person self-conscious and often sensitive. Added to that the emotional development is such that there is more or less upheaval. Feelings are intense, first against the opposite sex and then with a great interest for it. Hero-worship is strong; some older person is the object of love, sometimes of the same and sometimes of the opposite sex. A real friend of this kind is worth much to this growing boy and girl. They are more different one from the other, in their tendencies and interests, than ever before. This is the time when a degree of segregation is advantageous. Often there are morbid moods, dislikes, and irritabilities. Much

sympathy and patience are needed from parents and friends. Wholesome outdoor activities and work of many kinds are good tonics.

This is a day of judgments, day-dreams, and ideals, accompanied sometimes by admirations, sometimes by discouragements. Ideals are not airy impossibles, but ideas to be made real. Strong books—stories setting forth healthy ideals, lives of great men, books of travel associated with personalities are needed. Historic interest begins; the continuity and relationships of people and things; a vision of great movements will help to overcome too much introspection. A love of nature, evident in both girls and boys, makes possible much good from genuine farm and camp life. Self and superficial externals, with foolish emotional expressions, are forgotten in the simplicities and realities of country work and play.

The "gang" and the "bunch" are at their height in the early part of this period, until at fifteen to sixteen years there is a "pairing off." The social interest in groups should lead to altruism and to definite service for others. Herein is a great opportunity for strengthening development. Intellectual and moral outlooks are thus more truly balanced.

The beginning of a critical spirit marks this period. "Why," not in regard to material things—which in the previous period occupied attention—but to many problems of life. This is a time of questionings and perplexities; these, we find, are often not revealed until later years. Both boy and girl are apt now to be secretive, and especially the latter. Simple explanations from one who is trusted, even before questions are asked, will be of much help. At this critical stage the power to think will be strengthened by opportunity to search for and to arrive at conclusions. Many young people are stunted in intellectual and moral growth because they have been *told* much that they might discover for themselves through suggestive propositions. Judgment should not be a haphazard development but one definitely trained. Reason may control instinct and impulse, if it has had opportunity

to be active. A growing personality must be treated with respect, even in its unbalanced condition, if in the end it is not to be found wanting, but is to stand true to the needle of intellectual and moral integrity. In conclusion, we turn back for a moment and think of mental development and the growth of the human soul during sixteen years of childhood; first, as that of a social being who comes into social consciousness through self-revelation, then self-direction. These are continuing processes which lead finally to the beginning of self-realization. The human soul finds his freedom in being a part of an ever enlarging social group—first the family, then the school, then the community, and lastly, the state. Instinct, emotion, will, judgment, reason, are the mental activities by which he arrives; and innate interests are the responses he makes to the environment in which he finds himself.

(Note: A selected bibliography bearing on mental development, elementary psychology and practical child study will be found on page 460.)

CHAPTER V

THE GENERAL CONDUCT OF A HOSPITAL WARD

The Children's Ward.

Location of Ward

The children's ward in the general hospital has too often been incidental to the rest of the institution. The tendency has been to crowd the pediatric department into any space that could not be used for other purposes, regardless of its suitability. Conditions should have been exactly opposite, for if sick children are to be cared for in an institution their ward should have the most ideal location which the hospital affords. It should be separated from the rest of the hospital so as to lessen the danger of infection, for children have a lesser degree of immunity than adults. Isolation should be adhered to both for the welfare of the children and for the comfort of adult patients.

Arrangement of Ward

Infants and children of all ages suffering from medical diseases should be separated from those with surgical diseases. Sick infants under 2 or 3 years should not be in the same ward with older children. It is desirable for boys and girls over 5 years to be in separate wards, certainly those over 8 years should be separated. To include newborn babies in the "pediatric department" is now becoming customary, and this is certainly the most logical arrangement.[1] They are thus assured the care of a specialist from the beginning. They should have a separate nursery and should not be in the ward with sick babies. There should also be a special room devoted to the care of premature infants. There should be several isolation rooms for the use of very ill children or for

[1] Sedgwick, J. P., M.D., "Pediatric Control of Newborn Teaching Clinic."

those who have contracted contagious diseases. Every isolation room should have hot and cold running water. The private hospital for children has separate rooms; each one is equipped with a crib for the child and a large bed for the mother or nurse.

Diet Kitchen The diet kitchen from which all the older children's meals are served and where special foods are prepared for the younger children should be conveniently located. It should be equipped with a gas stove, a sink with hot and cold running water, a dish sterilizer, an ice-box large enough to contain all the food and fruit, cupboards for kitchen supplies, and all dishes necessary for serving the meals. Provide attractive dishes for the children's ward, dishes with Mother-Goose characters, animals or birds. Tin and enamel dishes crack and chip easily, becoming ugly and unsanitary. A convalescent child who rebels against food from a plain or ugly plate may be beguiled by a "story plate." Teach little patients to be careful, and give them attractive dishes. For convenience there should be a chart on which to enter each child's name and his diet and feeding orders.

Milk Laboratory A milk laboratory, where all formulæ are made and where all feedings are heated, is necessary, for milk formulæ should never be prepared in the general kitchen. The ice-box in this room should be large enough to contain all the milk used in the department; nothing else should be kept in it. A sterilizer for the nursing bottles should be conveniently located. If there are enough feedings to justify it, a milk sterilizer should be provided. A gas stove, a large sink with hot and cold water, and a large table or broad shelf on which to work complete the equipment.

Service Room The service room should be near the ward for convenience. It should be equipped with a hopper with hot and cold water where bed pans may be washed, and where feces may be brushed from soiled diapers. A large sink, an electric or gas plate, a bed pan sterilizer, a laundry bag frame for soiled linen, and one for soiled diapers, plenty of shelves or cup-

boards for utensils, a covered trash can, unless there is an incinerator, and bed-pan and urinal racks, so that each child's pan and urinal may be kept in a separate compartment marked with his name, are other essentials. If possible there should be an ice-box for cracked ice with which to fill ice-caps, etc., and also a closet with outside ventilation in which to keep urine and stool specimens, or else a special ice-box for them.

Bathroom

The bathroom equipment varies. There may be a shower bath for older children and a bath slab and spray for small babies. The slab is heated for use by admitting warm running water to the closed space in the porcelain under it. The temperature of the water for the spray may be controlled by a central mixing tank or by a storage tank above the slab. This tank has a water gauge and a thermometer on the outside. There should be a large bath tub for the older children or a high shallow tub—the latter is more convenient for the nurse. There should be separate toilet facilities for the boys and girls, and the toilet seats should be low.

Linen Room

The linen room should be furnished with shelves, drawers, and cupboards enough to take care of clean linen, children's clothes, and supplies which are used in the department. Separate lockers or compartments to contain each child's toilet articles, toys, etc., are useful, and may be built into any convenient place in the bathroom, linen room, or service room.

Dressing Room

A dressing room where all treatments and dressings may be done is essential. It should contain a sterilizer, an electric or gas plate, shelves or cabinets with sufficient space for sterile supplies, sterile solutions, dressing trays, and other equipment. There may be a common dressing table here upon which the children are placed for treatments, dressings, etc. If this is used the pad on it must be changed after one child has been put on it, and the rubber is scrubbed with soap and water as in the bathing of a child on a common table. A better arrangement is to move each child into the dressing room in his bed for dressings, etc.

The medicine closet must be locked at all times. It should

Medicine Closet have a basin with hot and cold running water, sufficient shelves for all medicines in use in the department, and it should be well lighted.

Warming Closet A warming closet in which to keep blankets always warm and ready for use is necessary. Salt, glucose, and sodium bicarbonate solutions and camphorated oil may be kept here also for emergencies.

Cubic Air Space Avoid overcrowding of the children's ward.[2] There should be not more than 10 to 15 children in one ward, with a minimum of 1000 cubic feet of air to every child. There are three main factors which enter into the question of cubic space for a child in a ward: 1. There should be space to afford reasonably pure air for respiration. 2. There should be space to allow sufficient separation of the cribs in order to minimize air-borne infections. 3. There should be space to avoid overcrowding, for the latter lessens the individual care which can be given to each infant by a limited number of nurses and attendants. Children are much happier in wards than in private rooms. If it is possible the ward should have southern and eastern exposures, with large windows on at least two sides. They should be equipped with screens, awnings, and dark shades. Each window should have two shades, one which may go up, and one down, from the middle of the window where they are attached. This allows the shade to be adjusted so as to exclude the least possible amount of sun. Shades should be lowered only when the sun is shining directly into a child's eyes, or during rest hour.

Windows

Lighting of Ward The lighting of the ward is important. Overhead lights should be shaded so that they reflect the light indirectly, and give a soft glow over the whole room. A side light on the wall between every two beds will give sufficient light to care for the children at night.

The temperature of the ward should not be over 68° F.

[2] "Ventilation and Cubic Space for Infants in Institutions." *N. Y. Medical Journal,* Nov. 10, 1917. A report by the Public Health Committee of N. Y. Academy of Medicine.

during the day. If baths are given to the children in their beds the temperature of the ward should be 72° F. during the bath hour. At night the temperature should not be over 65° F., but this varies with the age of the children, the nature of their complaints, and whether or not it is necessary to expose them in the ward during the night for treatments. The ward temperature should be noted and should be recorded every four hours on a chart which is provided for that purpose. The thermometer should hang on a level with the breathing zone of the patients. In the summer electric fans are necessary to create sufficient motion of air, but should not be so placed that they will blow directly upon the children. The essentials of good ventilation are: regulation of temperature, moisture and motion of air. Any system which fulfills these demands is satisfactory.[3] Windows which do not cause a direct draught should be opened several times a day to keep the air of the ward fresh and as free from disagreeable odors as possible. Humidity is a factor which is controlled with difficulty and is too often disregarded. Ideally, it should be 55 per cent. The radiators should distribute heat uniformly to all parts of the ward. They should be high enough from the floor to facilitate proper cleaning. Wire screens over them protect the children, preventing burns.

Temperature of Ward

Ventilation

Humidity

The walls of the ward may be painted any warm, cheerful color.[4] Stencil designs from Mother Goose which are painted at a convenient height for the children will amuse them. Make the ward as cheerful as possible. Window boxes with flowers or separate plants, a small victrola with appropriate records, a goldfish or two, or a canary are a few of the many things which help to give little patients endless delight and will actually hasten recovery.

Walls

The floor may be made of any of the materials in general use. It must be durable and easy to clean. The color should

Floor

[3] Rosenau, Milton, M.D., ''Preventive Medicine and Hygiene.''

[4] Ludlow, William, ''Color in the Modern Hospital.'' *Modern Hospital,* June, 1921.

harmonize with the walls. It must be cleaned as often as necessary. The method which is employed depends upon the material of which the floor is made. Any kind of floor may be swept with damp sawdust or sweeping compound to prevent dust. Sweeping should be done in the morning after the beds are made and it is usually necessary after lunch and after supper.

Furniture Cribs may be on one or two sides of the ward. In order to minimize the danger of "cross" infection, they should be at least 6 feet apart, allowing 100 square feet of floor space for each one, or there should be a glass partition between every two. Every child's name must be kept on his bed. There are various racks made to hold name cards. In a ward of small children these should be hung on a lower round at the foot of the bed so that the children cannot reach them. There should be a bedside table and straight chair by every crib. The type of table depends upon how much has to be kept at the bedside. If separate lockers are supplied (which is the ideal way) the bedside table can be without shelves. If there are no lockers, the table should have one or more shelves and possibly a drawer. There should be screens enough to screen the beds of older children when baths are given and for all other procedures which may expose the child.

Hand Basin A hand basin with hot and cold running water is necessary in a well planned children's ward. The water faucets should be operated by knee adjustments and the soap container by a foot pedal.

Sun Porch A sun porch with roof or awning and which is connected with the ward is desirable. This should be arranged so that beds may be moved on to it. Whenever the weather permits, the children should be there in their beds. An airing balcony with direct exposure to the sun, for a part of the day at least, is very desirable. Empty beds may be put here in the sun for disinfection. This porch may or may not have a roof. A sun porch which is enclosed with windows makes a good play room for convalescent children. It should be sup-

plied with small chairs and tables, also rocking and straight chairs, rocking horses, walkers and swings are suggestions to amuse the children. A roof may be made into an attractive roof garden for convalescent children. Here again window boxes have a place.

Signal System A signal or call system is necessary only for older children. Any of the systems which qualify for general use are satisfactory. The younger child will not understand how to use a signal system and should not be provided with it.

Glass Partitions Partitions between the wards and corridor and wherever they are possible should have glass inserted in the upper half so that the children may be more closely observed.

The head nurse's desk should be in a central place where she may have easy surveillance of the entire department.[5]

Cribs and Bedding.

When selecting a crib from the many different kinds of children's cribs, we must find one which meets the following requirements: 1. It must be comfortable and safe for the child. 2. Convenient for the nurse to handle. 3. Practical and easy to clean.

Size of Crib A size which will be suitable for children of all ages, except the newborn, is 5 by 2½ feet. Crib sides should be at least 24 inches above the level of the mattress so that the child can neither climb nor fall over them. Both crib sides should be adjustable, i.e., they must move up and down, and must have snaps or hooks at each end fastened so that the child cannot release them. Crib sides which move up and down by means of a foot pedal under the springs of the bed at each side are the safest.

Construction of Crib The bars of the sides, head, and front of the crib must not be more than 2½ inches or 3 inches apart at any place, for the child might put his head between them and might injure himself. The rods must also extend below the springs all around, and the frame of the springs must meet the

[5] Stevens, Edward (Architect), "A Modern Hospital of 20th Century."

rods of the head, foot, and sides, so there will be no open spaces.

Cribs should be made of steel, enameled iron, or aluminum in order to be as durable, as light, and as strong as possible. They should be equipped with large roller casters so that they can be easily moved.

For the convenience of the nurse the top of the mattress should be 2½ to 3 feet from the floor, and the sides when lowered should fall below the bottom of the mattress allowing room to make the bed and to tuck in the clothes without interference from the lowered crib sides.

Cribs must be practical and easy to clean. There should be no extra ornamentation to collect dust and to prevent thorough cleaning of the bed with soap and water.

There is a crib in common hospital use in which the springs and mattress can be raised or lowered within the frame, instead of having adjustable sides. As long as this crib fulfills the above requirements it is satisfactory.

Springs The crib should have a wire spring, tight and firm. **Mattress** The mattress should be of horsehair. This is the most comfortable, durable, hygienic, and cleanly. It is the most expensive as well but can be made over so that it is cheaper in the end. The mattress should be covered with a stout linen ticking. It should be protected by a washable cover of unbleached cotton which fits over it as a pillow case slips over a pillow.

Pillows Pillows are made of hair, feathers, or down. Down pillows are expensive and are used only in small sizes. They are not practical for use among children in a hospital. Hair pillows are advisable for them, as they offer support. Feather pillows are in common use. Children should be taught from the start to sleep without pillows. A small baby needs none until he is old enough to begin to sit up, when a hair pillow, protected by a rubber covering, may be placed at his back for support a short time each day. A small pillow may be placed at the head of the bed to protect the baby from draughts. An older child who is confined to his bed will need

pillows during the day, a hair pillow for support and a feather one for greater comfort. These must be removed at night unless the child's illness is such that it requires him to be propped up all the time. Therefore, a children's ward should be supplied with both hair and feather pillows of various sizes. Except when used for older children, all pillows used should be protected by rubber slips. These may be sewed on all the pillows in the department if desired. This rubber is uncomfortable and heating but very necessary for the protection of the pillow. A folded towel or pad made for the purpose may be kept under the head of a very small baby so that if he drools or regurgitates it may be easily changed without changing the sheet. **Rubber Pillow Slips**

Sheets are best made of heavy cotton, well shrunken, ¾ of a yard longer, and ¾ of a yard wider than the mattress, with a 2½ inch hem at the top and a 1 inch hem at the foot. **Sheets**

The rubber sheet is best made of double faced silk rubber, which may be of white, black, or maroon, and should be 1 yard longer than the width of the bed and not less than 24 inches shorter than the length of the bed. **Rubber Sheets**

The draw sheet can be made of single faced, canton flannel or cotton drill, large enough to completely cover the rubber sheet. **Draw Sheets**

Blankets of ⅔ cotton and ⅓ wool are the most practical for hospital use. All wool are light, warm, and most desirable, but expensive and more difficult to launder. **Blankets**

The spread should be of light weight dimity. **Spread**

The pillow slips should be of cotton sheeting in the desired sizes for pillows. **Pillow Slips**

To Make up a Crib.

To Make up Empty Crib

a. *Object:* **Object**

1. Cleanliness.
2. Firmness.
3. Tightness.
4. Smoothness.

5. Comfort of patient.
6. General appearance.

b. *General directions to bear in mind:*
1. Make up on one side first, and then on the other.
2. Have everything ready before beginning.
3. Put everything in its place when through.
4. Let no detail escape notice.

Equipment

c. *Articles necessary:*
1. Clean linen in the order in which it will be needed.
2. Laundry bag for soiled linen.

Procedure

d. *Method of making an empty crib:*

Loosen all bedclothes, remove pillows and place on a chair. Remove soiled pillow cases, putting them in the laundry bag. Remove every piece of covering separately, keep the upper surface inside, fold along creases and drape over the back of the chair. Take care not to drag the corners on the floor. Put the lower sheet on the mattress right side up, broad hem at the top. Tuck it in at the top first, then at the foot and the sides, making square corners. The rubber sheet is put on 6 inches from the top edge of the mattress. Tuck it tightly under the sides of the mattress with the middle of the width in the middle of the bed. The draw sheet is put on crosswise of the bed over the rubber sheet to completely cover it; tuck it under the mattress. The upper sheet is put on wrong side up, the center fold at the center of the bed, and with the top edge 2 inches from the top edge of the mattress. The blankets (usually two) are put on 6 inches from the top of the mattress. The first blanket is not tucked in at the foot but is folded under so that it is level with the lower edge of the mattress. The second blanket is tucked in at the foot like the sheet. The upper sheet is folded down over the blankets at the top and the blankets are tucked in at the sides. The spread is put on with the top even with the top of the mattress. Tuck in the foot and tuck in the sides, making square corners. Put the pillow cases on the pillows, hair and feather, so that the seams of the covers correspond with

the seams of the pillows. Shake the pillows well into the corners of the cases and place them flat on the bed, the hair one under the feather one, and with the seam edges of both cases and pillows at the head of the bed and the superfluous case folded under the pillow at the head of the bed. Place them so that the open ends of the pillow cases are on the side away from the door.

To Make up Crib with Child in it

e. To make up a crib with a child in it:

1. Preparation as in preceding procedure.

2. See that the temperature of the room is 70° to 72° F. if the child is to have a bath at the same time. See that he is not exposed to any draughts. Do not beat up the pillows on the bed while he is in it. All folding of bedclothes is to be done at the foot of the bed, not over the patient's face. Never lean on the bed, jerk it, or touch it unnecessarily, for a sick child is more sensitive and more irritable than a sick adult. A child is never put on another's bed, nor on a convenient empty bed while his bed is being made. If he has permission from the doctor he may sit in a chair at the side of the bed while it is being made, otherwise he remains in bed. All covering, with the exception of one blanket, which is left on for the protection of the child, is folded and put over the back of a chair as in making an empty crib. The child is turned from one side of his bed to the other while the opposite side is being made. If he is to sit up in bed arrange the upper bedclothes so that they come to his waistline. If he is to lie down in bed arrange them so that they come 2 inches below the axilla. The spread is turned under the blankets at the head of the bed, and the top sheet is turned down over all in a finished fold. Always put the crib sides up when leaving a child.

To Sit a Child up in a Bed.

Back Rest

There are bed rests made to fit cribs just as for adult beds. The back rest is arranged at the desired angle and the pillows are adjusted at the patient's back to make him comfortable. A small child who is to sit up in bed can be propped up with

2 or 3 hair pillows and a feather pillow at his back. Arm supports can be made by placing pillows on both sides of the patient as for an adult. He may be kept from slipping down in bed, when he is sitting up, as in Fowler's position, by a sling or support under the knees, or by a brace at the **Knee Support** feet. There is a special knee support—Meinecke, nonslipping knee and thigh brace—in common use. This is put under the knees and the patient is made comfortable with the use of pillows (protected by rubber slips) over it. It may have to be tied to the sides of the bed to keep it in place if the child is heavy or active. A special knee roll, the proper size for a child's use, can be made of horsehair covered with ticking and rubber. This is placed in the center of the sheet diagonally and is rolled in it. It is put under the child's knees and the corners of the sheet are tied to the head of the crib on a level with the mattress. A small pillow covered with a rubber case can also be made into a knee roll. Roll the pillow lengthwise, tie a bandage around each end to hold it and fold it in a sheet diagonally, place it under the patient **Foot Sling** and tie the same as the regular knee roll. A foot sling is made by folding a sheet lengthwise in folds about 10 inches wide. Tie a piece of bandage at each end and tie the ends of the bandage to the head of the bed on either side, level with the mattress, and with the center of the folded sheet at the patient's feet to support them. It should be just tight enough so that the patient's feet rest in a sling when his knees are **Air Mattress** extended. An air mattress made of rubber covered with ticking or canvas is used for a child, as for an adult, in any case confined to the bed for a long time and in which there is danger of pressure sores. Small air pillows are useful **Air Ring** for the prevention of pressure spots. Air rings are made in smaller sizes for children.

To Disinfect a Bed after the Discharge of a Patient.

Care of Bed and Bedding after Discharge of Patient

When a patient is discharged all bedclothes are removed from the bed and are put into the laundry bag. The mat-

tress and pillows are brushed on both sides with a whisk-broom. The bed is scrubbed with soap and water and Bon Ami. The rubber is washed on both sides with soap and water and is hung over the head of the bed. The bed, mattress, pillows, and rubber sheet are exposed to the sun and air as long as possible. It is very desirable that they be put on a porch for this airing. If the case was infectious or after the death of a patient air the bed for 3 consecutive days before using it for another patient. If not isolated for infectious disease, the minimum length of time to air the bed is 2 hours, but wherever possible air any bed for 3 consecutive days in the open air and exposed to the sun. Every article which can be disinfected by boiling should be boiled after the discharge of a patient. Articles which cannot be boiled should be scrubbed with soap and water and should be exposed to air and sun.

Rest Hour.

A definite rest hour should be arranged for children in the hospital. Directly after the noon meal seems the most convenient time. During that hour all toys are put aside, the shades are lowered, the ward is kept as quiet as possible, and every attempt is made to have the children sleep. Even though a child cannot sleep, he should not be allowed to talk, read, or play with his toys. Under these conditions he will soon acquire the nap habit. **Rest Hour**

Visiting Hours.

Visiting hours are best restricted to once a week in the pediatric department. This may be arranged for at any convenient time. If a child is dangerously ill, his parents must be allowed to see him at any time. Never more than two people should be permitted to see him at once. No children should be allowed under any conditions. (It is wise to exclude all visitors except parents.) Visitors should remove their hats and coats in a special room and should slip on large **Visiting Hours**

cotton aprons which completely cover their own clothes before entering the ward where the children are. Any one with an upper respiratory infection or with any infectious disease should not be permitted to visit the children's department. Parents or visitors should never be allowed to sit on the cribs; the nurse must see that they all have chairs. Visitors must never hold or fondle the children. Kissing must be prohibited. There should be definite rules about what visitors may bring. Toys, games, books, and all such amusements are solicited. Food of any kind except fruit should be prohibited. Since oranges are about the only fruit that nearly every child may eat, it seems wise to have a rule allowing visitors to bring only oranges.

Toys.

Toys Every child's toys are kept in his table or locker. He must not change toys with other patients. There should be a central supply of toys in every ward for the use of the children who have none of their own. These should be made of material which may be washed, preferably boiled, after the use of one child before giving them to another. If a child throws his toys on the floor, they must be tied to the side of the crib. Books help to amuse older children and a library of books should be available for their use. A book should be well aired after one child has read it before it is given to another. If the child was isolated for an infectious disease, the book must be sterilized or destroyed. A child should never be allowed to play with money. Would-be "friends" are constantly giving pennies to the child in the hospital. These should be taken from him, should be put in an envelope marked with his name, and should be kept until he is discharged.

CHAPTER VI

THE CARE OF THE SICK CHILD IN THE HOSPITAL

Admitting the Patient.

The Admitting Ward

Many institutions for children have an admitting ward. It should have small rooms or cubicles, each complete for the care of one child. Since every child here should be considered an infectious case, the equipment should be like that of a contagious ward. It would be very desirable to detain every new child in the admitting ward until the doctors determine that he has no contagious disease, but since the incubation periods of all the common contagious diseases vary from one day to three weeks, such a ward is of little value unless a child may be kept there for three weeks. This is impossible, of course, unless there is a special observation ward provided, which will allow it. If there is no such observation ward, every new child should be kept in the admitting ward until the cultures of the nose and throat have been taken and have been returned negative, and in the case of a little girl, vaginal smears must be taken and must be reported negative for gonorrheal vaginitis. If there is a history of recent exposure to any contagious disease or if the child presents suspicious symptoms he should be kept in the admitting ward and considered infectious until it has been proven that he is not.

Care of Child's Clothes

The institution, with the exception of the private hospital, should furnish all the necessary clothes for the child during his stay. Therefore, when he is admitted, all his clothes should either be sent home with his parents or should be carefully marked and put in a central locker room. All valuables, such as rings, jewelry, etc., should be removed and should be sent home with the clothes or they must be carefully marked and must be put in the hospital safe.

Valuables

Admission Bath

The new child should have a bath and shampoo in the admitting ward. This bath may be a shower or tub bath, depending upon the facilities; the usual individual technique should be carried out, allowing no child to come into contact with anything used by another child. If the new child is very ill or if he has a temperature over 101° F. or below 98° F., he should have only a sponge bath, unless otherwise ordered by the doctor. The shampoo is omitted if he is very ill or fatigued.

To Mark Child for Identification

Every child under 2 years old who is admitted to the hospital should be marked or should be tagged in some way. His name and hospital number should be written on a tag and should be attached to him in such a way that it will not come off. This should be put on him on admission before he is taken to the ward. Various methods are employed; a simple method is to write the name and hospital number across the center of a piece of adhesive, 2 inches long, ¾ inches wide, fold this over the middle of a piece of linen tape long enough to go around the child's wrist in a square knot. This must be watched, because it will occasionally come off. (See Methods of Marking Newborns for Identification, Chapter VII.)

If There Is No Admitting Ward

If there is no admitting ward, the new child can be undressed and given his admission bath in the ward. Spread a sheet over his bed, put him on it, and remove all his clothes. The bath depends upon the facilities. A shower or tub bath is most desirable. Proper isolation precautions must be strictly observed. The child should be treated as an isolated case until the nose and throat cultures and vaginal smears return negative. Careful isolation and good technique conscientiously carried out will prevent the spread of infection or cross-infection.

Aseptic Pediatric Nursing Technique.

Aseptic Pediatric Nursing Technique

Aseptic nursing has decreased the morbidity and mortality among children in hospitals. Every child should have his own utensils or toilet articles which should be kept on his

bedside table or preferably in a locker or compartment in the bathroom. Here also may be kept the individual articles necessary for the care of a child, consisting of:

1. A white enamel wash basin.
2. A kidney basin.
3. A white enamel mug for mouth wash.

(If there is a convenient utensil sterilizer these articles may be boiled after use and do not need to be kept separate.)

4. Two bath blankets.
5. Brush and comb in bag for that purpose.
6. Tooth brush in bag for that purpose.
7. Towels—bath towel, face towel, wash cloth.

After touching one child a nurse must wash her hands under running water, if possible, before touching another child. If running water is not convenient an antiseptic solution, as 1 per cent lysol, may be substituted. No article which comes into contact with one child should be used on another until it has been washed or, if possible, sterilized. If a nurse has an upper respiratory infection, she should wear a face mask covering her nose and mouth while she is in the department. Doctors, attendants, or any individuals who go near the children must observe this rule. When a child is convalescent and is allowed to be up, he must never visit the bedside of another child. He may have his chair and toys at his own bedside and must remain there or he may be taken to a sun porch in a wheel chair. A small child not old enough to understand the reasons for such rules must not be allowed out of his bed. Older children who have no infectious diseases and who are out of bed may, with precautions, go to the toilet.

To Handle the Child.

The handling of the child is greatly minimized by the skillful nurse when giving him the necessary care. She will think ahead enough to make every move count and will do everything possible for him while he is in one position. Much harm

can be done to a tiny sick baby or a premature by too frequent or clumsy handling. **To Lift Infant** To lift an infant, place one hand and arm under his neck and shoulders with his head in the bend of the elbow and the middle of his back resting on the

Figure 1. To Carry a Baby

palm. Slip the other arm under his legs. This gives the necessary support to the head and back. **To Lift Child** To lift an older child place one hand under each of his arms. **To Carry Infant** To carry an infant the nurse puts her right palm under the back of his head, with her forearm supporting his neck and back; she holds him with his feet toward her, slipping them under her

right arm and bracing his buttocks on her right hip. She then has her left hand free to open doors, etc. The nurse may also carry the baby in her arms with his neck in the bend of her elbow and her left forearm supporting his back. If he is very heavy, she puts her right arm over his legs and slips her right hand under his buttocks. In a hospital when caring for many babies the nurse must carry every baby so that he comes in contact with her uniform as little as possible by holding him away from her. When a child is strong enough to sit up, he will sit on the nurse's arm facing her and will brace his body against her chest when being carried. She may slip her other hand behind his back for extra support. When walking with a small child, help him by holding one hand and adjust your gait to his; do not walk so rapidly that he has to run to keep up; and do not keep a step or two ahead of him so that you are dragging him along by one arm.

To Carry Child

Physical Examination of Children.

Physical Examination of Children

The physical examination of the child in the hospital may be done in the admitting ward on a special examination table, a high table covered with a pad and rubber. It may be done after the child is admitted to the ward; there it is best to have him in his bed for the examination. If done on the table the sheet or pad must be changed between children. The common examination table gives one more place for a child to come into contact with things which may have been in contact with other children in the ward, unless good technique is conscientiously carried out. The examination can be just as successful if done in the bed, if the beds are properly constructed and high enough to be convenient for the doctor and nurse to work over him. Wherever it is done the room must be quiet.

Physical Examination Tray

A tray containing the necessary articles for the physical examination is convenient. This may be used for all examinations and may be carried by the nurse when making rounds with the staff doctors. Any articles, such as the tape measure,

percussion hammer, etc., which may be contaminated by use, may be wiped with an antiseptic solution, as 1 per cent lysol, or may be put in the sun for 3 or more hours. The tray, size, 12 by 18 inches, contains:

1. Tongue depressors in a small glass jar.
2. Flashlight.
3. Tape measure, marked in centimeters and inches. (Linen tape in a metal case; the metal tape is harsh and may cut the child if he struggles.)
4. Percussion hammer.
5. Paper bags (small) for waste, such as used tongue blades.
6. Skin pencil.
7. Scratch pad and pencil.
8. Glass slides, in box.

Temperature of Room

The room in which the child is to be examined should be 72° F. The examination is much more successful and quicker if the child can be kept quiet. This is not always possible, for if he has just been admitted he probably will be somewhat frightened and homesick and will be crying when the examination is started. If he is not crying at the start, careful, tactful handling may prevent it.

Preparation of Child

The child is to lie on his back with a pillow under his head. Remove all clothing except the diaper, put a blanket over him and turn the bedclothes down to the foot of the bed.

The doctor's and nurse's hands should be warm before touching the child. Handle him as little as possible during the examination, making every move count. Do not use force or restraint unless necessary and be careful not to frighten him by abrupt, unexpected moves.

Order of Examination, Abdomen

If the child is not crying, the abdomen is usually palpated first while he is lying on his back; then the chest and lungs are ascultated and percussed.

Chest

If the end of the doctor's stethoscope is metal, see that it is warmed before it comes in contact with the chest.

Back

When the back is examined, if he is not too sick, the nurse may hold him in a sitting position (by holding his hands in hers). If he is too ill to sit up, he may

be turned from one side to the other or he may be turned on his abdomen. The rest of the examination is done then, leaving the nose, throat, mouth, eyes, and ears until the last because the child invariably cries when these are done. The small baby will have to have his arms wrapped in a blanket and pinned tightly to restrain them.

FIGURE 2. CHILD WRAPPED IN BLANKET TO RESTRAIN HIM

Throat To examine the throat let the child lie flat on his back in bed, hold his head steady while the doctor opens his mouth and examines it with the aid of a tongue depressor and a flashlight. **Ears** For the examination of the ears restrain the child's hands in the same way; if he is a small child and struggles violently pin the blanket down over his feet. **To Use Direct Light** If an auriscope is used for the ear examination, the child may remain in his bed; turn his head from one side to the other as each ear is examined. **To Use Indirect Light** The doctor may prefer to use a head mirror and reflect the light from it into the throat and ears. In this case a drop light, which can be attached to the head of the bed at the right angle to reflect the light, is necessary. The nurse may hold the child on her lap to have his throat and ears examined. If so, she and the doctor sit on two chairs facing each other. For throat examination the nurse holds the child on her lap, after his hands have been wrapped in the blanket, with the back of his head pressed against her chest and his head supported by her hand; his body and legs are held restrained between her knees. For ear examination the child sits sidewise on the nurse's lap with his head

pressed against her chest and she steadies it with one hand. He is turned on the other side for examination of the other ear. The auriscope or the head mirror and drop light may be used. (The drop light must be adjusted behind the nurse's shoulder at the proper angle to reflect the light from the mirror into the child's ears.) The ear speculum used for a child must be as small as possible and still must have a large enough lumen to admit the ear curet or any other instrument that may be used. A sick child's ears are examined very frequently because otitis media is a common complication of almost any disease in childhood. An ear tray, size 12 inches by 8 inches, is convenient:

Tray for Ear Examination

Equipment:

1. Various sizes of sterile ear specula. These should be washed and boiled after use and may be kept in a sterile covered jar.
2. Ear curetts—two or three sizes to fit specula of various sizes.
3. Wire applicators.
4. Paracentesis knife.
5. Jar of sterile toothpick applicators, made with fluffy ends to absorb any discharge from the ear.
6. Jar of sterile medicine droppers.
7. Jar of sterile absorbent cotton.
8. Handling forceps in 5 per cent lysol.
9. Bottle of alcohol.
10. Auriscope with extra lights, or head mirror and drop light with a cord long enough to reach from the nearest light socket to any bed in the ward.

Eyes

It is often difficult to hold a child's head still long enough for the doctor to see into his eyes with the opthalmoscope. The older child can remain in his bed and the nurse holds his head steady and instructs him to hold his eyes open and there is little difficulty. A small child who cannot understand the procedure will have to be held. Wrap and pin him in a blanket, the doctor sits in a chair and the nurse sits in one in front of him, placed sidewise of his; she holds the child sidewise facing the same direction the doctor does; he then places

the child's head between his knees and holds it steadily with them, while she holds the child's body quiet during the examination. A small baby may cry less if the nurse holds him on her lap for the entire examination. The nurse and doctor sit on two chairs opposite each other. The baby lies flat on his back on her knees to have the abdomen palpated; he lies on his abdomen on her knees to have his back examined or she may hold him over her shoulder for it. To have the throat and ears examined he is held as given above.

Temperature, Pulse, and Respiration.

Temperature

The temperature of a child under 10 years should never be taken by mouth. There are two reasons for this: 1. We can never be sure that he understands the procedure so that he keeps his lips closed enough to insure an accurate registration of temperature. 2. A small child not accustomed to a thermometer may bite off the end and injure himself by swallowing the mercury or bits of glass. Therefore, as routine, every child under 10 years of age should have his temperature taken by rectum, unless there is some disease of the rectum or special reason why it should not be irritated by the insertion of a thermometer. In such a case the axilla or groin may be used; of the two the axilla is more accurate. The temperature by rectum registers a little higher (about a degree) and by axilla a little lower (about a degree) than it does by mouth. When charting a temperature the nurse must indicate how it is taken.

To Take Temperature by Rectum

To take a child's temperature by rectum shake the mercury below 95° F., lubricate the bulb of the thermometer with vaselin, and insert it gently into the rectum 1 inch, and hold it there from 2 to 5 minutes, depending upon the length of time the special make of thermometer demands. The nurse must stand beside a child and hold the thermometer in his rectum while it registers, for grave injury may result if it should break in the rectum. A child should not be taken from his bed to have his temperature taken. He should lie on his side when the thermometer is inserted in the rectum, and

it should be directed slightly backward. A small child who struggles can be better restrained if he lies flat on his abdomen. The thermometer should then be directed downward; for the course of the rectum changes with the position of the child.

To Take Temperature by Axilla

To take a temperature by axilla, remove all the clothing from the shoulder and arm, place the bulb of the thermometer in the hollow of the axilla, pointing toward the back; have the child cross his arm over his chest, pressing it tightly to his side and with his hand on the opposite shoulder. It takes 10 minutes for a thermometer to register correctly by axilla. The nurse must support the patient's arm to help him to hold it in this position. Care must be taken that no folds of clothing are between the arm and the side to separate them and alter the temperature.

Care of Thermometer

Every child in the hospital has his own thermometer, kept in a glass plainly marked with his name, and filled with sterile boric solution, 4 per cent; a thin pad of cotton is put in the bottom of the glass to protect the end of the thermometer. The solution in the glass must come to within 1 inch of the top of the thermometer and it should be changed daily. When the child is discharged, the thermometer must be washed with soap and water and must be disinfected by soaking for 24 hours in a 1-1000 bichloride of mercury solution. All the thermometers should be tested weekly by comparing them with a thermometer which is known to be accurate to see that they register correctly. The thermometers of all the children in the ward, except those of isolated cases, can be kept on a common thermometer tray. This tray should also contain:

Thermometer Tray

1. A paper bag for waste.
2. A tube of vaselin.
3. Tissue paper wipes made of toilet paper, cut in 2-inch squares.

To apply the vaselin to the thermometer squeeze a little of it on a paper wipe and lubricate the bulb. After removing

the thermometer from the child's rectum clean it by wiping with a paper square before replacing it in the solution.

A child's respirations and pulse must be taken when he is quiet, preferably, asleep; they should be taken before the temperature, since the excitement which may be caused by the inserting of the thermometer may increase the rate of the pulse and the respirations. In an older child the pulse can be taken without difficulty at the radial artery; this is usually impossible in a small child; it can be counted more easily at the femoral, carotid, or temporal arteries or by placing the fingers lightly over the fontanelle. If a child's pulse is extremely weak a stethoscope may be used to count it.

To Take Pulse

To Take Respirations

A child's respirations can best be counted by placing the hand directly over his chest. Many doctors do not care to have pulse and respirations taken or recorded routinely for small children under a year or two of age. The temperature, pulse, and respirations of a child who is ill in the hospital must be taken twice a day, in the morning and in the afternoon. If his temperature is over 100° F. or below 98° F. it should be taken every four hours. Any baby whose temperature is below 98° F. should have external heat applied.

Weighing.

The metric system, kilograms and grams, is used for weighing a small baby and pounds and ounces are used in weighing the older child, although the former may be used for both.

Scale

A balance scale is the most reliable and the most accurate. It should be on wheels so that it may be taken from one bed to the next; a fresh towel should be put on the scale before a child is placed there. When a daily weight is ordered the child should be weighed regularly with the same relation to the feeding time every day. All the children are weighed upon admission. Generally children under two years are weighed daily, while children over two years are weighed once a week, unless otherwise ordered. If a child is too little or too weak to stand or sit on the scale, the nurse may hold him in her

arms and weigh both herself and him, then subtract her weight.

Bathing of Infants and Children.

Purpose of Bathing

1. The object and use of a bath:

   a. Cleanliness.
   b. General stimulation—to improve circulation.
   c. To reduce temperature and inflammation.
   d. As a nerve sedative and a nerve tonic.
   e. As a counter-irritant.
   f. Medicated baths in specific cases for local effect on the skin and the general action on the skin.

Temperature of Bath

2. Temperature of the bath: [1]

a. Cold bath	33- 65°
b. Cool bath	65- 75°
c. Temperate bath	75- 85°
d. Tepid bath	85- 92°
e. Warm bath	92- 98°
f. Hot bath	98-112°

The temperature of the bathroom or ward where the child is bathed should be 72° F. and should be protected from draughts.

Frequency

3. Frequency of bath—a daily bath is necessary for a sick child.

Time for Bath

4. The ideal time for a bath is in the morning before breakfast; this is not possible in an institution. The bath must not be given immediately after eating, since the superficial blood vessels dilate, diverting the needed blood supply from the digestive organs. One hour should intervene between eating and bathing unless the meal is of liquids or of a very light diet, when half an hour is sufficient.

Kinds of Baths

5. There are three kinds of baths:

   a. Sponge bath.
   b. Tub bath.
   c. Shower bath.

[1] Maxwell and Pope, "Practical Nursing."

6. The technique for individual isolation must be carried out when bathing a child, i.e., prevent one child from coming in contact with any other child or with articles used on another child. **Observe Pediatric Technique**

a. A sponge bath must be given to a very sick infant or child or if the temperature is over 101° F. or below 98° F. It may be given to any child of any age or size in his bed and seems the most practical and the safest method of bathing a child in an institution. **Sponge Bath for Infant or Child**

b. If tub baths are given, the tub must be thoroughly scrubbed with soap and water after every child's bath before the next one is bathed in it. The child must also be protected from direct contact with other children while he is being prepared for his bath and while he is being dried and dressed. For an infant a table or shelf can be used which should be covered with a pad and rubber. A fresh towel is put down on this pad before a child is put there; the towel is changed and the rubber is scrubbed with soap and water after every child. It seems best to undress the older child and prepare him for his bath at his bedside, taking him to the tub for his bath and then taking him back to his bed to be dried and dressed. **Tub Bath for Infant** **Tub Bath for Child**

c. Many hospitals are equipped with porcelain bath slabs and showers. The bath slab slopes to a sink, a tank over it mixes the water to the desired temperature, and a pipe and rubber tubing with spray attached convey the water to the child. A clean quilted pad should be put on the bath slab for every child to protect him from the hard, cold, or contaminated surface. After each child is bathed the slab is scrubbed with soap and water and a clean pad put on it for the next. The infant is prepared for his bath and is dressed after it at his own bed or on the common dressing table, as described under the tub bath. **Shower Bath for Infant**

To give a shower to an older child who is able to stand or walk, prepare him for his bath at his bed, put his slippers on, and let him walk to the shower wrapped in his bath **Shower Bath for Child**

blanket. After the shower wrap him in his towel and blanket, let him walk back to his bed to be dried and dressed, the same as in the tub bath.

Bath Tray

A bath tray containing the necessary articles is used to give any kind of bath to a child. A tray for every child is not necessary, because with good technique a nurse need not contaminate anything on the tray but can use it for one child after another. There should be a tray for every nurse, which she can use for all the children whom she bathes. Isolated cases should have separate trays. Cake soap should never be used for children in an institution, since the cakes may be confused and infection thus carried. Powdered castile soap may be used. This irritates the mucous membranes of the nose and causes sneezing if particles of it escape when it is being used. Liquid soap may be used. It is prepared by adding cake soap to water and boiling it. The bath tray includes the following articles:

a. Jar of unsterile cotton pledgets made of second grade cotton (size of a walnut).
b. Jar of sterile cotton pledgets made of best grade cotton (size of a marble).
c. Two small enamel basins—4 inches in diameter, 1 sterile for sterile boric solution, 1 unsterile for unsterile oil.
d. One glass of unsterile toothpick applicators—made of best grade cotton wound tightly on the small end of a toothpick.
e. One shaker of powdered castile soap. (Large aluminum sugar shaker or, if liquid soap is preferred to powdered, a bottle of liquid soap.)
f. One bottle of bathing lotion—50 per cent alcohol.
g. One bottle of zinc stearate powder.
h. Nail scissors, file, orange-wood sticks.
i. Paper bag for waste.
j. Tray with safety pins, various sizes.
k. Handling forceps in glass of 5 per cent lysol solution.
l. Bath thermometer.
m. One bottle of unsterile oil.
n. One bottle of sterile boric acid solution, 2 per cent.

Sponge Bath.

The procedure for giving an infant or a child a sponge bath in his bed: Every child has his own basin which is filled with water 100° F. and is taken to his bedside with the necessary clean linen, clothes, bath towel, face towel, wash cloth, laundry bag for soiled linen, bath tray, and bath blankets. Arrange linen and clothes in the order in which they will be needed, place the bath blanket in folds (crosswise) over the child's chest, tuck the upper corners under the mattress on both sides to keep it from sliding down, turn the upper bedclothes down, drawing the blanket over the child at the same time; a second bath blanket may be used and is slipped under him; remove the nightgown. When bathing a small, active child it will be necessary to wrap the lower bath blanket tightly around him and pin his hands down while his face and head are being washed. **To Give Sponge Bath to Infant or Child**

The eyes are cleaned first: To do this remove a sterile eye pledget from the jar with the handling forceps, dip it into the basin of boric solution then replace the forceps, take the pledget in the fingers of the right hand, hold the child's head on the left side with the palm of the left hand, and with the left thumb and forefinger hold the lids of his left eye open. Do not press the fingers on his eye ball but on the bones of the orbit. Wash the left eye beginning at the inner canthus and wiping toward the outer so that the secretions of one eye will not be carried to the other. If there is much secretion in the eye use more than one pledget. Never dip a pledget back into the boric after it has been used. Waste pledgets are put in the paper bag. The child's right eye is washed in the same way, hold the pledget in the left hand, hold his head in position on the right side with the right hand and wipe towards the outer canthus. **Eyes**

The ears are cleaned next; unsterile toothpick applicators are used; dip one in the basin of oil and with it wipe around the external ear, do not let the toothpick enter the auditory canal; use a different applicator to clean the other ear. For **Ears**

older children dip the applicator in the pan of bath water instead of the oil.

Nose The nose is cleaned next with unsterile toothpick applicators dipped in oil. Wipe only around the anterior naris and use a different applicator for each nostril.

Face, Neck Wash the child's faee, neck, behind ears, under the chin, with clear water without soap and dry by patting with the faee towel.

Hair A child should have a shampoo once a week. An infant has a daily shampoo with his bath until his hair is so thiek that it will not dry quickly. To do this the nurse moistens her hands in a pan of water and moistens the child's hair; she then sprinkles powdered soap in the palm of her hand and rubs it into the hair making a lather. Hold him on the left arm with his head in the palm of the left hand and over the basin of water and with the right hand squeeze water from the wash cloth through his hair until it is thoroughly rinsed; take care not to get water into his eyes and ears.

Body If the child has been pinned in a blanket, release him. His body is next bathed in the following order: right arm and hand, left arm and hand, chest, abdomen, back and neck, right leg and foot, left leg and foot, buttocks and genitals. Use a nail brush if necessary to clean finger and toe nails. Expose only the part of the body which is being washed, keep the rest covered with the upper bath blanket; dry every part with bath towel as soon as it is washed. After drying the child's back and while he is still on his side rub his back with bathing lotion and powder it. Turn him as little as possible during the bath. **Genitals** **Girl** When bathing a little girl, separate the labia and wash away secretions inside the folds with a boric sponge, wiping down away from the urethra toward the rectum. There is much difference of opinion among pediatricians regarding the **Boy** care of the prepuce of a little boy. Many authorities do not wish the nurse to retract the foreskin to eleanse the glans of smegma. Some claim that the dried secretions or smegma collected in the genitals will cause irritation which leads to

harmful habits, as masturbation. Others claim that too frequent handling of a child's genitals to clean them will call his attention to them to such an extent as to produce bad habits. Find out what the doctor's wishes are in regard to this. To clean the glans hold the penis in the left hand and retract the foreskin with the thumb and finger and wipe away any secretions with a boric pledget held in the right hand, then allow the foreskin to slip back.

Use of Toilet Powder

Little powder needs to be used on a child and only zinc stearate or boric powder if any. Too much cakes in the creases and the granules cause irritation. Oil rubbed in the folds and creases where two surfaces are in contact is usually more satisfactory than the former. The child's fingers and toe nails are cleaned with the flat end of a toothpick and are cut when necessary; a small baby's finger nails must be quite short so that he cannot scratch himself.

Nails

After the bath the child is dressed, his hair is combed, the blankets are removed, and his bed is made up.

Tub Bath.

To Give Tub Bath to Infant

The equipment for giving an infant a tub bath is:

1. Bath tray with contents.
2. Child's individual basin of water to wash his face.
3. Clean clothes arranged in the order in which they will be needed.
4. Bath towel, face towel, and wash cloth.
5. Bath blankets.
6. Laundry bag.

If a common dressing table is used, take this equipment there, put a clean towel over the pad and place the child upon it. If no such table is in use, take the equipment to the child's bedside. Proceed as when giving a sponge bath, washing his ears, eyes, and nose as in a sponge bath and washing his face with clear water in a basin without soap and drying it. Then wrap him in his bath blanket, take him to the tub with his bath towel, wash cloth, and soap shaker. After he is washed, wrap him in his bath towel and blanket and take

him back, either to the common dressing table or to his bed to dry and dress him. If the common dressing table is used, every child can have a separate towel kept at his bedside and this may be spread on the table before he is put down there. After use, if it is not soiled, it can be folded, clean side inside, and can be kept in his locker or at his bed.

To Give Tub Bath to Child

The procedure for giving a child a tub bath: Fill the bath tub half full of water 105° F. so that it will be 100° F. when ready for use. Spread a bath mat or gray blanket on the floor by the tub; place a stool or chair beside the tub, and see that the bathroom is 72° F. and free from draughts. The equipment is the same as given above for sponge bath. Take the child's basin of water to his bedside with the equipment. Wash his eyes, ears, nose, and face as when giving a sponge bath. If the child is able to walk, put his slippers on him, wrap his bath blanket around him and let him walk to the bathroom (if he is not able to walk the nurse carries him). Take his bath towel, wash cloth, and soap shaker with him. Put him in the tub and give him his bath, using the powdered soap. Do not leave him in a tub of water longer than ten minutes unless otherwise ordered. If his condition permits, give him a general rinsing with water 70° F. after the bath, then wrap him in his bath towel and blanket, and take him to his bed to dry and dress him. If he is able, let him walk back.

Shower Bath.

To Give Shower Bath to Infant

To give a shower bath to an infant the equipment is the same as for giving a tub bath, without the soap or basin of water and it is taken either to the bedside or to the common dressing table. The child's ears, eyes, and nose are washed the same as in the tub bath. He is wrapped in his blanket and is taken to the shower. A clean pad is put on the bath slab. He is removed from the blanket and is placed upon it. A container of liquid soap may be hung over the bath slab and may be connected by a rubber tubing to convey the soap

to the child's body. Soap his head and body, making a good lather. The water for the shower should be 100° F. The nurse tests it carefully with her hand before turning it on the baby and she keeps her hand over the end of the spray so that the water touches her hand before it touches him. His head and body are sprayed, taking care not to use too much force with the spray, also being careful not to get water in his eyes and ears by keeping the hand over them and by keeping his face turned away from the spray. After the shower wrap him in his bath towel and blanket and take him back to his bed or to the common dressing table to be dried and dressed.

To Give Shower Bath to Child

To give a shower bath to a child the equipment is the same as given above; take it to the bedside; the routine is the same. Wash the child's eyes, ears, nose, and face, wrap him in his blanket, put his slippers on and let him walk to the shower, since only the children who are able to stand are able to take the shower. Make a lather with the soap and soap the child's body; test the temperature of the shower carefully and turn it on the child. It should be 100° F. and can be followed by a quick shower of 70° F. if the child's condition will permit. Wrap him in his bath towel and blanket, put his slippers on and let him walk back to his bed, dry and dress him.

Clothing for Children in Hospitals.

Clothing for Newborn Baby

The clothing for the newborn in the hospital may be the same as for the newborn in the home. The band can be made of old cotton cloth torn in strips instead of flannel. Some hospitals furnish a complete newborn's outfit—shirt, petticoat, and slip. Other institutions dress the newborn in a sleeveless cape; this is fastened in back with tapes and is made double around the top. It takes the place of all other clothing except the diaper, but necessitates wrapping the baby in a blanket all the time. It has the advantage of saving laundry; it takes less time to dress and undress the baby; it costs less to equip the newborn's ward with these capes than with the complete

outfits. But its use is limited to the first few weeks of life, since it restricts natural motion of arms and legs too much to be worn longer than that.

Clothing for Infant

A sick infant 1 month to 2 years of age should be dressed in shirt, stockings, diaper, and nightgown. These should be of all cotton material because the usual hospital ward has an even temperature. Stockings should always be put on the sick child except in very warm weather, until he is old enough to know that he should keep his feet under the bedclothes. After that he may need them for extra warmth. If a child sits up in bed and needs extra clothing, a little wrapper or jacket of some bright colored flannel will answer the purpose. A red flannel jacket is cheerful and warm, but difficult to launder and shrinks easily. The usual hospital nightgown for the child of any age opens all the way up the back and fastens with tapes. Safety pins should be avoided as much as possible in dressing him.

Wrappers

Nightgown

Diapers

Hospital diapers are best made of cotton bird's-eye in various sizes to fulfill the need of children of different ages.

Clothing for Child

A sick child of any age should wear a shirt and nightgown. The shirt should open in front and the nightgown in back. The day and night clothing are the same. Stockings or socks are worn if necessary for warmth. A wrapper or kimona is useful for extra warmth when a child sits up in bed. Pajamas may be furnished for little boys if desired. A sick child should always sleep between cotton sheets unless his condition is such that a blanket next to him is indicated, as in nephritis.

Necessary Clothing for Children's Ward

The ward should be equipped with complete outfits of clothing for children of all ages for the use of those who are up, for when a child is out of bed he should be fully dressed. Therefore underclothes, shirts, drawers, or union-suits, underwaists, garters, stockings, and shoes or slippers must be supplied. Sandals are very satisfactory for hospital use. Rompers can be worn by both boys and girls up to 6 or 8 years and are very practical for hospital use, both in original expense and in laundering. One piece play suits or

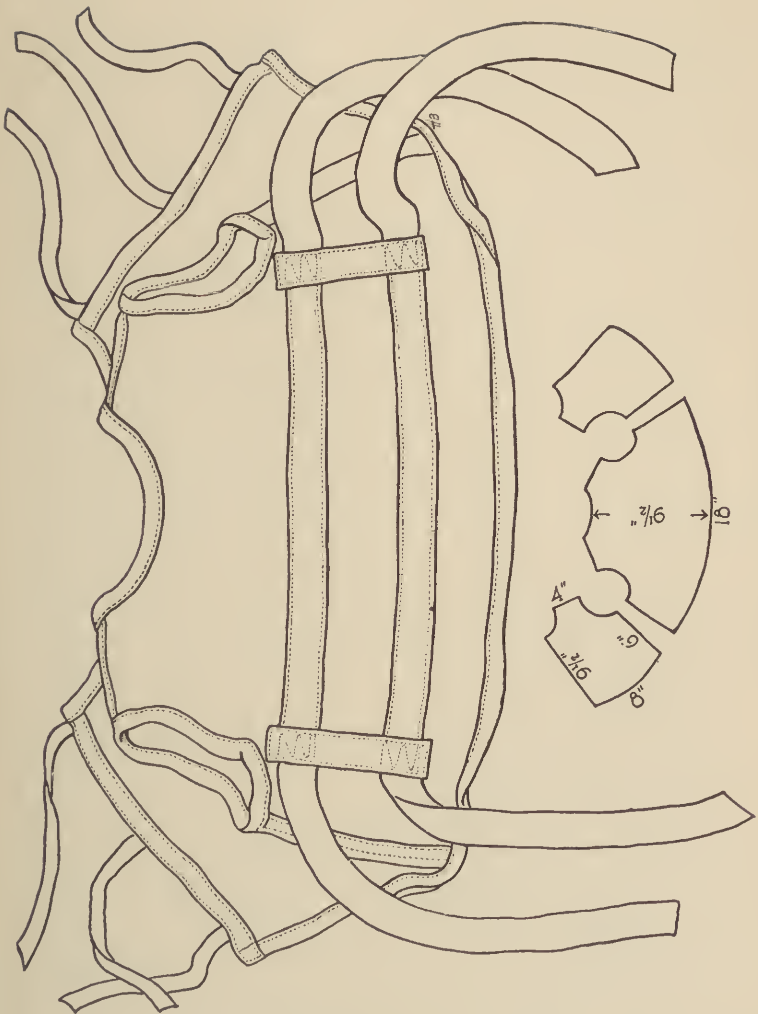

FIGURE 3. RESTRAINING JACKET

cover-alls can be used for older boys and dresses or aprons with bloomers to match for older girls. The convalescing child of from 1 to 3 years is not old enough to understand that he should remain quietly in his bed. As he begins to feel better he becomes more active, standing up in his bed a greater part of the time. If his condition will allow him to do this, it is well not to restrain him; make his bed up in the regular way, a closed bed; cover the entire top of it with a rubber and over that a sheet, tucking it in at the sides. In this way his bed will serve as a play pen and the mattress is protected; if the bed is properly constructed, he cannot fall over the sides or hurt himself.

Restrainers Restrainers of all sizes are necessary. An older child, unless delirious, will usually remain quietly in bed. But a small child under 2 or 3 years, unless he is desperately ill, is very active and his condition may be such that it is essential for him to be quiet. In such a case a restrainer is useful. A delirious child will also have to be restrained. A suitable restrainer can be made of heavy material as canvas or unbleached muslin. This is made like a sleeveless jacket or child's underwaist and fastens in back with heavy tapes; long heavy tapes of webbing $1\frac{1}{2}$ to 2 inches wide are stitched across the front so that when the jacket is on the tapes will reach the sides of the crib and can be tied to the frame of the bed under the mattress and springs.

Bibs Bibs are necessary; turkish toweling is a very suitable material. A child can use his bib for several meals unless damp or soiled. After use it can be folded and may be kept on his bedside table or may be put in his locker or it can be kept under his mattress at the head of his bed.

Cuffs It is often necessary to keep a sick child's hands from his face for one reason or another, as, for example, after an operation for congenital cleft of lip or palate; to prevent him scratching his face, as in eczema; or to prevent thumb sucking. Stiff cuffs which immobilize the elbow joint will accomplish this; these can be made of heavy cardboard, as mill board or

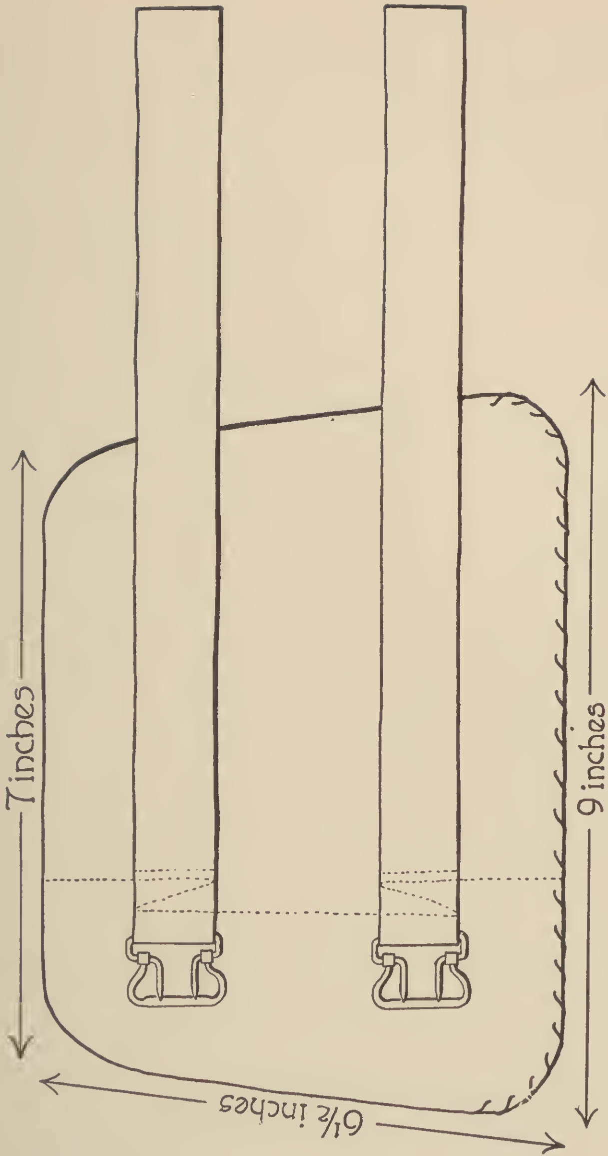

FIGURE 4. CUFF TO IMMOBILIZE ELBOW JOINT

Bristol board, covered with a soft stout material, as canton flannel or twill, and are fastened with one or two heavy tapes with buckles, depending upon the size of the cuff. To make these cuffs cut two pieces of material in the desired size and shape; stitch one or two buckle straps on the front of one piece and stitch the two pieces together on the wrong side, on three sides only, leaving the fourth side open to slip the cardboard in and sew this side by hand. When the cuff is soiled, the cardboard can be removed by ripping the stitches on the side that is sewed by hand; the cuff is then laundered and a new cardboard put in. Cuffs may also be made by stitching ordinary wooden tongue blades between two pieces of material the right size to go around the child's arms and tying with tapes.

Aluminum Mittens There are aluminum mittens which can be put on the child's hands to prevent thumb sucking.

To Tie a Child's Hands It may be necessary to further restrain a child's hands by tying them to the sides of the bed. To do this protect the wrists by wrapping a small piece of sheet wadding around them and tie the bandage over it, using the clove hitch. To tie the clove hitch make 2 loops forming a figure 8 with both ends on top and going in opposite directions; put the loops together and pass them over the hands drawing them just tightly enough to prevent the hands from slipping through. Make a knot in both ends about 12 inches from the arm and tie the ends to the frame of the bed under the mattress. (See note 1.)

A child's legs are restrained in the same manner.

A thin muslin cap is useful to hold dressings on the child's head. The department should be supplied with various sizes of bonnets.

Oral Hygiene of Infancy and Childhood.

Care of Infant's Mouth There is no scientific indication for washing the mouth of either a breast or artificially fed baby until the teeth have erupted. The normal secretions of the mouth are quite sufficient to maintain proper cleanliness. The mucous mem-

brane is easily injured and Epstein has conclusively demonstrated that washing the mouths of infants causes infections, as thrush and stomatitis.[2] The mother's breasts must be kept clean (see care of breasts); and the nipples and bottles for the artificially fed baby must be washed thoroughly and boiled before use. A few swallows of water may be given after either a breast or bottle feeding. The nurse must see to it that the baby puts no unclean objects, as a dirty toy, into his

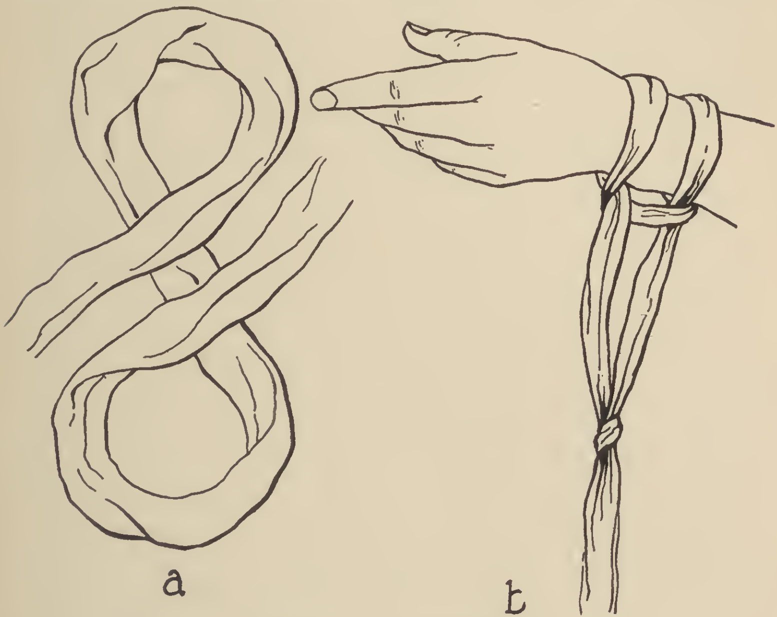

FIGURE 5. CLOVE HITCH

mouth; no one should ever be allowed to put fingers into the baby's mouth to clean it or for any other reason. Since any baby may suck his own fingers more or less, his hands must always be clean. As soon as he has teeth they must be cleaned twice a day; a wooden applicator or toothpick with the end wound with cotton is used. It is moistened with (1) normal saline, (2) milk of magnesia, (3) boric acid solution 2 to **Care of First Teeth**

[2] Marcus, Joseph H., M.D., "Care of Mouth in Early Life." *Amer. Journ. of Nursing,* Mar., 1922.

4 per cent, or (4) sterile water. At 2 years he should be provided with a small tooth brush and some simple tooth paste or powder and should be taught to care for his own teeth; they should be cleaned twice a day, in the morning before breakfast and in the evening before going to bed. The child in the hospital should be supplied with a tooth brush as soon as he is admitted and he should use it twice a day, in the morning before breakfast when his face is washed and in the evening when he is prepared for bed. The nurse must care for the teeth of a small or sick child; the convalescent may brush his own teeth but must be taught to do it properly and must be supervised.

Routine Care of Child's Teeth

Tooth Brush

The tooth brushes on the market are made soft, medium, and hard; the hard brush is preferred. It should be small with 1 row of bristles grouped with spaces between for the child under 5 years and with 2 rows of bristles for the child over 5 years. (Dental Department, University of Minnesota.)

To Brush Teeth

To brush the teeth, place the powder or paste on the brush and start to clean the teeth with the brush dry; the dry brush loosens the sordes from the teeth, where the moist one would not; there is sufficient saliva to moisten the brush. The first step is to place the tooth brush flat on the buccal surface of the left upper molar region and turn it with a sweeping motion toward the occlusal surface of the teeth; this motion cleanses the gum tissue, thereby stimulating it, and it cleanses the broad surfaces of the teeth and the intradental spaces. Continue the motion around the jaw to the right molar region; reverse the position of the brush to the right lower molar region and continue around to the left lower molar region, using the same sweeping motion. Change the brush to the lingual surface of the left lower molar region and continue to the right; change the brush to the lingual surface of the right upper molar region and continue to the left. In order to clean the anterior teeth around the curve of the mouth on the lingual surface turn the brush so that the end is in contact with them. To complete the cleaning place the brush with the

bristles on the occlusal surface of the left upper molars and continue to the right; change the brush to the right lower molars, occlusal surface, and continue to the left. The advantage of this procedure is that all the motions are from left to right, right to left, upper and lower teeth, in rotation, thus making it easy and simple for the child to remember the routine. In order to thoroughly clean the teeth, the stroke should be repeated 8 times on the same surface. Rinse the mouth with warm normal salt solution.

Care of Tooth Brush

To care for the tooth brush after use scrub it with castile soap and warm water, rinse it well with warm water, dip it in normal salt solution, and sprinkle it with dry salt; let it hang or stand in a glass. Before use shake off the dry salt.

Mouth Wash for Sick Child

A very sick child or the child with an elevated temperature will have to have his teeth and mouth cleaned for him. Sordes quickly collect on the teeth and the tongue becomes covered with a coating of food particles, epithelial cells, and bacteria mixed with secretions of the mouth. The lips become dry and cracked. A neglected mouth is a dangerous source of infection because (1) it is a source of pollution to the food and saliva which is carried to the alimentary tract; (2) the collection of bacteria on the tooth surfaces leads to gingivitis and pyorrhea; these bacteria can be absorbed by the blood stream.

Dangers of Neglected Mouth

Equipment

a. *Equipment:*
1. Kuroris or forceps.
2. Pledgets of absorbent cotton (size of walnut).
3. Two kidney basins.
4. Glass with solution.
5. Tongue blade.
6. Rubber syringe (ear syringe).
7. Towel.
8. Cold cream.

b. *Solutions which may be ordered:*
1. Normal saline.
2. Potassium chlorate.
3. Listerine 50 per cent.

4. Glycerin, lemon, boric (equal parts).
5. Boric acid 2 to 4 per cent.
6. Dobell's 5 per cent.
7. Myrrh 25 per cent.

Procedure

c. *Procedure:*

To prepare the tray in the dressing room remove a supply of sterile cotton pledgets from a jar with sterile handling forceps and place them on the tray. Take the tray to the bedside. Place the towel under the patient's chin and place the kidney basin at the side of his face; place a cotton pledget in the forceps so that the end of the forceps is well protected to avoid traumatizing the mouth; dip it in the solution; hold the forceps in the right hand as a pencil; with the left hand take the tongue blade. Have the patient hold his mouth slightly open, insert the tongue blade to hold the cheek away from the teeth, insert the forceps with the cotton pledget and clean the buccal surfaces of the teeth and gums, using a circular motion. If a large pledget is used, the insides of the cheeks are cleaned at the same time. Clean the lingual surfaces of the teeth, the roof of the mouth, and the occlusal surfaces, following the same routine as when brushing the teeth. Use as many pledgets as necessary to thoroughly clean the mouth; put soiled pledgets in the kidney basin on the tray. To clean the tongue have the patient hold it out as far as he can; if it is very coated and is not too tender to permit, clean it with the tooth brush, brushing toward the tip. If it is too sore for this use a cotton pledget. Fill the syringe with water and rinse the patient's mouth, letting him expectorate into the kidney basin. Apply cold cream to his lips if necessary. The frequency of the mouth wash depends on the condition of the mouth; it may have to be done as often as every 2 hours; it should always be done before and after he takes nourishment.

If a child refuses to open his mouth, it can be opened by a tongue depressor slipped between the teeth and can be held open by a mouth gag. The ordinary wooden mouth gag is

rather large for a small child. Two or three tongue blades put together with the end covered with absorbent cotton and several thicknesses of gauze held in place with a narrow strip **Mouth Gag**

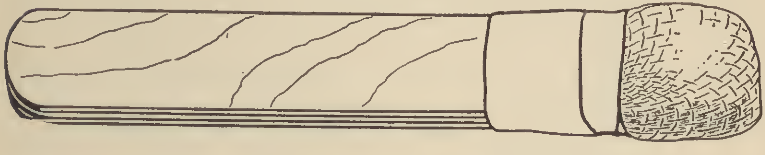

FIGURE 6. MOUTH GAG MADE OF TONGUE BLADES

of adhesive make a good mouth gag. After it is inserted it can be turned sidewise and left in while the child's mouth is being cleaned.

Care of the Hair and Scalp.

The infant has a daily shampoo with his bath until his hair becomes so long and heavy that it cannot be dried easily. Daily washing of the scalp prevents formation of dandruff and crusts known by the laity as "cradle cap." If a baby has a seborrheac exudate a little oil or vaselin, lard, or any prescribed ointment can be rubbed over the scalp at night when he is put to bed and is washed off with his shampoo in the morning. Seborrhea on a baby's scalp should always be called to the doctor's attention.

Routine Care of Child's Hair

Every child in the hospital has a separate comb and brush kept in his table or locker. These are sterilized after his discharge. He has his hair combed twice daily, in the morning after his bath and when being fixed for the night. Bright colored hair ribbons may be used for little girls; at night these must be replaced by pieces of bandage.

Care When Admitted

When a child is admitted, he has a shampoo if he is not too ill and his head is thoroughly examined for nits or pediculi. A shampoo is given every week while he is in the hospital and his head is thoroughly looked over then because he can contract infections so easily in the institution.

To Give Shampoo to Girl

Shampooing Long Hair.

a. *Equipment:*

1. Basin of water.
2. Pitcher of water 110° F.
3. Small pitcher of water 75° F.
4. Soap solution in a container.
5. One bath towel, 2 hand towels, and wash cloth.
6. Safety pins.
7. Large rubber sheet or apron provided for the purpose (with one end cut to fit around the neck, and with tapes to tie).
8. Small rubber.
9. Soft nail brush.
10. Hair brush, comb, and fine comb.
11. Bathing solution.
12. Foot tub or pail.
13. Blanket.

b. *Procedure:*

Procedure

Fold back the upper bedclothes, covering the child with the blanket. Remove all but one pillow; bring it over to the side of the bed; have the child lie on her side with her back even with the edge; place the small rubber covered with a hand towel under her head and face. Fold a hand towel over one end of the rubber sheet and pin it tightly around her neck, with the other end sloping into the pail, which is on a chair at the side of the bed or on the floor, depending upon the length of the child's hair. If the rubber apron is used, tie this around the neck in the same way. Roll the edges of the rubber sheet to form a trough from the head to the pail. Moisten the hair and scalp with water and pour the soap solution over them; rub the scalp vigorously with the tips of the fingers; pour warm water from the pitcher over the head and hair. Rinse well by pouring water over the hair, use water 75° F. last, squeeze the water from the hair, roll it in a bath towel, unpin the rubber from the child's neck and remove it with the pail. Move the child to the middle of the bed, leaving the small rubber and towel under her head. Spread her hair out over this, rub with the bath towel, and fan until dry; rub bathing solution into the scalp when the hair is partly dry.

Shampooing Short Hair, as the Dutch Clip.

To Give Shampoo to Boy

a. *Equipment:*

1. Large rubber sheet and small rubber sheet.
2. Basin.
3. Wash cloth, bath towel, and 2 face towels.
4. Nail brush.
5. Bathing solution.
6. Brush, comb, and fine comb.
7. Pitcher with water 110° F.
8. Pitcher with water 75° F.
9. Soap solution.
10. Blanket.

b. *Procedure:*

Fold back the upper bedclothes covering the child with the blanket. Move the child down about a foot from the top of his bed. Place 2 pillows covered with a small rubber and towel under his shoulders to elevate them, place a basin under his head above the pillows. Cover one end of the large rubber sheet with a hand towel and pin it around his neck; let the other end extend under his head over the pillows into the basin; wash his hair the same way as given above with soap and water, pouring the water from the pitcher over his head into the basin below it. Wrap his head in the bath towel when through, unpin the towel and rubber around the neck and remove with the basin, move the pillows back to the head of the bed and leave the small rubber and towel under the head until the hair is dry; rub as in the above method.

Treatment for Pediculi or Nits.

If a child has pediculi kerosene or tincture of larkspur may be used to kill them. The treatment is best applied at bedtime followed by the shampoo in the morning.

a. *Equipment for applying a kerosene cap:*

1. Kerosene, 1 part with 3 parts of oil in glass container.
2. (Cotton pledget) gauze square.
3. Vaselin on cotton pledget.
4. Safety pins.
5. Triangular drape or dressing towel.
6. Kidney basin.

b. *Procedure:*

Rub the skin around the edges of the hair with vaselin on a cotton pledget. Thoroughly saturate the scalp and hair with the kerosene mixture on the gauze square. Pin the triangular drape or towel around the child's head, completely covering his hair. To put the triangular drape on, place the middle of the longest side in the middle of the forehead, bring the 2 ends completely around the head and over the third end in the back, tying snugly in front in a square knot. Turn the edge up over the knot and arrange neatly in back. If the child is very active, this may not stay on; to secure it put a piece of bandage under the chin and pin it under each ear with a small safety pin. (Tincture of larkspur, full strength, is applied in the same manner. Vaselin is not necessary.) The cap is left on until morning. A shampoo is then given; if all the pediculi are not dead repeat the cap the next night. If the child has many pediculi, keep a cap on his head during the day to prevent spreading them.

Triangular Head Bandage

Treatment for Nits

If he has nits use hot vinegar and water in equal parts to dissolve them. Fine comb the hair, first saturating it with vinegar. Separate the hair into small strands and draw each strand through a compress saturated with hot vinegar. Repeat this every day until the nits are destroyed and follow with a shampoo.

To Prepare a Child for the Night.

To Prepare Child for Night

Put away all his toys, flowers, etc. Wash his face and hands, clean his mouth and teeth (if he is able he brushes his own teeth). Loosen the top bedclothes, brush all crumbs from the bed with the hand or a folded towel; see that the bed is dry. Rub the child's back and legs with bathing solution (medicated alcohol, 50 per cent). Remove the pillows for the night unless the child's condition is such that they are required; give him a urinal and a bed pan. Tuck in the lower bedclothes tightly and adjust the upper bedclothes. Have an extra blanket folded at the foot of the crib. Give him a drink

of water. Sick children in a hospital should be ready for bed and sleep at 7 P.M. The temperature of the ward at night can usually be 65° F. to 60° F., unless there are dressings, treatments, etc., to be carried out which expose the child.

Temperature of Ward at Night

Charting.

Pediatric Charting

The pediatric nurse must be able to observe symptoms closely in order to ascertain her patient's condition; she must also be able to record these observations on the chart accurately and in the minutest detail. As in all charting she must be able to express her meaning clearly and concisely, using as few words as possible to accurately convey her meaning. Notes of any change in the patient's condition or unusual symptoms must be made by the nurse as soon as she notices them. She must also record the child's defacations and urinations at once, never trusting to her memory or to the patient's word to check up on them at the end of the day. In the rush of the present moment it is so easy for the nurse to put off such things until a less busy time comes. No careful nurse will allow herself to do this, even when caring for adults, and when caring for children there is much more reason why she should not, since they cannot be expected to remember details accurately or to understand their significance. It is usually convenient to have a notebook ruled into spaces for recording names of patients, temperatures, pulses, respirations, weights, defecations, urinations, etc.; record can be made in it of things as they occur and the book can be taken into the ward for the more convenient recording of temperatures, etc. At the end of the day these records are to be copied on the permanent individual charts. To economize on space symbols may be adopted to indicate various kinds of stools. The children's charts should be hung on racks or should be kept in a special chart container on the head nurse's desk; they should not be kept at the bedside, since the children are apt to destroy them if they are within their reach; also parents and visitors will be tempted to read them if they

are there. They should be taken to the beds just before staff rounds, however, and collected immediately afterwards.

Care of a Child after Death.

To Care for Child after Death

Whenever a sick child in a hospital is not as well as usual the parents should be notified and if they wish they should be allowed to remain with the patient. The doctor should be notified at once if the child suddenly grows worse.

As soon as respirations cease, the nurse should close his eyes by pressing the lids down with her fingers, should straighten his extremities, and should put a roll of bandage under his chin. Nothing more is done until the doctor has seen the child and has pronounced him dead. If the parents are not present, they should be notified at once; if they are present, give them a few minutes alone with the child before asking them to leave so that the body can be prepared for the morgue. The nurse can profitably employ these few minutes in preparing her equipment to lay out the body, which consists of the following:

Equipment

1. Child's individual toilet articles.
2. Bath tray.
3. A laundry bag.
4. Morgue box which contains:
    - a. Morgue sheet.
    - b. Shrouds.
    - c. Roll of bandage, 1½ or 2 inches wide.
    - d. Roll of bandage, 4 inches wide.
    - e. Clothes tags.
    - f. Old cotton cloth or compress for diaper.
    - g. Adhesive.
    - h. Pad of waste cotton covered with gauze 8 or 12 inches square.
    - i. Common pins.

Procedure

Remove all of the upper bed clothing except the sheet, remove the child's clothing, elevate his feet to allow any fluid to drain from the mouth and nose. A very small child can be held up by the feet. If the eyes do not stay shut, place a piece

of wet cotton over the lids. Leave the roll of bandage under the chin to keep the mouth closed.

Clean the body with soap and water. If there is an open wound, remove the dressing, put fresh gauze over it and fasten with strips of adhesive. Comb the hair in the customary manner; use a piece of bandage for a hair ribbon for the little girl. Tear a piece of old cotton cloth or a compress into the right size for a diaper and put it on with the waste cotton pad in the center over the rectum and genitals, turn the edges in and pin neatly in front and on the sides at the knees. Tie the knees and ankles together with pieces of bandage 1½ or 2 inches wide. If it is a small baby it is necessary to tie the legs only once. Put the shroud on, cross the arms over the chest, and tie the wrists together with a piece of bandage. With another piece 4 inches wide make a four tail bandage to hold the jaw in place; remove the roll of bandage from under the chin; remove the wet cotton pledgets from the eyelids. If they do not stay closed, insert a piece of wet cotton under the upper lid of each eye with the end of a toothpick.

Make out two tags with the child's name, ward, date, and hour of death; tie one to the child's wrist.

The morgue sheet should be large enough to completely cover the child. Place him in the center of it, fold the sides up over his body, and pin them with common pins, then fold the ends over his feet and head and pin them down. The second tag is pinned to the outside of the sheet. The nurse accompanies the body to the morgue.

Care of Personal Belongings

It is the nurse's duty to see that the child's personal belongings are ready for the parents; especially his toys must be saved for them, no matter how trivial and worthless they may seem, for parents will always treasure them. If the child had a communicable disease, disinfect the toys by boiling, if possible; if not possible, wash them with 1 per cent lysol solution or put them in the sun from 3 to 24 hours. (Care of bed and mattress after death discussed under care of beds.)

CHAPTER VII

THE NEWBORN BABY

The Nursery

The hospital nursery for newborn babes should be as ideal as conditions permit. The rules given for the selection of the home nursery (Chapter III) should be carried out in the institution as far as possible, especially in regard to the choosing of the room, heating, lighting, ventilation, and temperature, remembering that 1000 cubic feet of air should be allowed to every infant.

Equipment

A common hospital crib for newborns is a basket-shaped, heavy wire crib about 14 by 24 inches. Six to ten of these are suspended from one standard which usually has two rounds, an upper and a lower. The cribs are placed alternately, first one on the upper round and then one on the lower, so that the babies nearest each other are not on the same level. If these cribs are used, it is impossible for the nurse to get near enough to the baby to do anything for him in his crib. It is necessary, therefore, to have a common dressing table equipped with a rubber sheet and pad.

Aseptic Nursing Technique

The rules for individual isolation of older children (Aseptic Pediatric Nursing Technique, Chapter VI) must be carried out for the newborn babes, because the younger the child the more susceptible he is to infections. The nurse must wash her hands after touching one child before doing anything for the next one. A good way to carry out individual technique in the nursery is to spread a clean towel on the common dressing table and place the baby on the towel when he is to be bathed, changed, etc. After he is put back in bed the towel can be folded with the clean side inside and hung on the foot of his crib. This makes it possible to use the towel several times or

until it is soiled. The same technique should be used in weighing the baby on the common scale. The ideal nursery has a separate little crib and bedside stand for each baby with space enough between them so that the nurse can work over each baby in his own crib, carrying out every procedure, bathing, changing, etc., without lifting him from his crib. This eliminates the unsafe, common dressing table. Some cribs are made with a cupboard under them in which the child's individual equipment may be kept. If there is not such a place, a locker or drawer should be provided for every baby in which his towels and basin can be kept. If individual articles are not possible, everything coming in contact with one baby should be sterilized before being used for the next one.

A newborn baby is cleaned with oil until his cord comes off and the umbilicus is healed and dry. Then water baths, tub, sponge, or shower, may be given as for older children. If the nursery is equipped with separate cribs and bedside tables, the sponge bath can be given the baby in his bed. The bath equipment and the necessary linen are taken on a tray to his bedside and his individual basin is filled with water. A tub bath may be given if a separate bath tub is supplied for each baby and if there is space available where the tubs may be kept. Sometimes they may be placed on a shelf under the crib. A tub bath may be given in a common tub, of course, if it is thoroughly scrubbed with soap and water after each baby is bathed. Porcelain or marble bath slabs can be used for newborns as for older children. The quilted pad on the slab must be changed and the slab must be scrubbed with soap and water between baths. If given a tub or a shower bath, the babe can be undressed and his eyes, ears, and nose can be cleansed and his face can be washed at his bedside, if the nursery is equipped with individual cribs and bedside stands. Otherwise the child is placed on the common dressing table for this. The rubber on the dressing table must be scrubbed with soap and water between each bath because more or less moisture soaks through to it during a bath.

Artificial Respirations.

As soon as a child is born he should begin to breathe. Usually his entrance into the colder air from the birth canal will cause him to gasp and to breathe irregularly at first, but gradually more regularly. The normal baby will start to cry at once, a short, feeble cry, but increasing in strength. It is important that he should cry as it helps to expand the lungs so that they can properly fill with air. Asphyxia neonatorum is that condition of the newborn baby in which primary respirations are not spontaneously established with sufficient force to maintain life. Asphyxia may be due to mucus in the air-passages. It is very important to clear the uppermost air-passages before the child makes the first gasp. To do this hold him up by his heels until the roof of his mouth fills with mucus, then tip his head backward to allow it to drain out. (See method of resuscitation in Figure 7.) Nothing should ever be introduced into the baby's mouth to wipe it, neither cotton nor gauze on the finger nor an applicator, as the mucous membrane of the mouth is easily injured and if once abraded is subject to such infections as thrush. If the newborn fails to breathe, respirations may be stimulated in several ways. Whatever the method is, the essential points to bear in mind are:

Asphyxia Neonatorum

To Clear Mucus from Air-Passages

Essential Points in Giving Artificial Respirations

1. The method must be gentle and simple. Most forms of artificial respiration are too strenuous.

2. The baby must be exposed as little as possible. The following methods are recommended by Dr. J. C. Litzenberg of the University of Minnesota:

Method I

Method I. Hold the infant so that the neck rests between the thumb and forefinger of the left hand, allowing the head to fall far backward, the upper portion of the body resting on the palm of the hand. With the right hand the knees are grasped between the thumb and fingers, the thighs resting against the palm of the hand. Expiration is produced by folding the baby's body on itself like a jacknife with the head

Expiration

downward, thus allowing mucus to drain into the mouth at the same time that air is forced from the lungs. (See Figure 10.) Inspiration is produced by reversing the movement, **Inspiration**

FIGURE 7. METHOD OF RESUSCITATION
(From DeLee's "Principles and Practice of Obstetrics," Courtesy of W. B. Saunders Co.)

unfolding the baby's body. (See Figures 8, 9.) The body is thus alternately folded upon itself and unfolded as movements are carried out. Repeat 10 or 15 times a minute. The movement of expiration should be made first with the body **Frequency of Movement**

completely inverted. This method is simple, efficient, and not overfatiguing to the infant. It is also of great advantage in

FIGURE 8. BYRD'S METHOD OF ARTIFICIAL RESPIRATIONS. POSITION FOR INSPIRATION
(From Edgar's "Practice of Obstetrics." Courtesy of P. Blakiston's Sons & Co.)

that it can be carried out while the child is in a tub of water 100° F., thus preventing loss of animal heat.

FIGURE 9. BYRD'S METHOD OF ARTIFICIAL RESPIRATIONS. POSITION BETWEEN INSPIRATION AND EXPIRATION
(From Edgar's "Practice of Obstetrics." Courtesy of P. Blakiston's Sons & Co.)

Method II

Method II. Direct inflation of the lungs by mouth-to-mouth breathing is another method which may be employed to

resuscitate the child with asphyxia. Place him upon his back with his head extended by means of a small pillow under his neck; the operator places a piece of gauze (3 or 4 thicknesses) over the infant's mouth and by placing his mouth directly over the infant's and blowing into it, he inflates the lungs. The air is expelled by gentle pressure upon the chest, and the blowing repeated several times if necessary. The danger of the above method is overinflation of the lungs; the blowing

FIGURE 10. BYRD'S METHOD OF ARTIFICIAL RESPIRATIONS. POSITION FOR EXPIRATION
(From Edgar's "Practice of Obstetrics." Courtesy of P. Blakiston's Sons & Co.)

must be very gentle. Do not cover the nose during the process, but leave it open as a safety valve.

General Rules

In all cases where artificial respiration is used, the first movement should be that of expiration to expel, as far as possible, mucus or other foreign substances from the air-passages. The movements should be made not more than 10 or 15 times a minute and not too forcibly, the baby being kept in a tub of water 100° F. between movements and as much as possible during them. Hold the finger over the heart to keep check on its action during the process and as long as it continues to beat resuscitation is possible.

To Tie Cord

The cord is generally tied after pulsations have ceased. A

sterile linen tape is tied in a square knot ½ to 1 inch from skin margin and again ½ inch above that, the cord being cut between the two ties. A sterile dressing is put over the umbilicus and the ends of the linen tape are tied around it to hold it in place.

Cord Dressings

Cord Dressings.

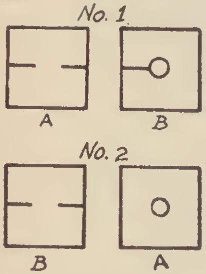

FIGURE 11. CORD DRESSINGS.

No. 1

A is placed on end of cord, the linen tape is brought up through slits on either side and tied over the end of the stump. This cannot be changed. B is slipped around the stump under A and is changed when soiled.

No. 2

A is slipped over the stump with the cord through the hole. B is tied on the end of the stump with linen tape. Neither can be changed.

Care of Umbilicus

The umbilicus is treated as a surgical wound until the cord has fallen off, the wound has cicatrized, and has healed over, which takes from 4 to 8 days. The cord should be touched as little as possible; the sterile dressing is changed only when soiled and the abdominal binder every day after the bath. Normally, nothing else need be done to the cord, for the original dressing usually stays until the cord drops off. After this time a sterile dressing is kept on for several days, until the umbilicus is thoroughly healed. Any unusual appearance of the cord is reported at once.

First Care of Eyes

In a normal delivery as soon as the baby's head is born, before the body is delivered, the nurse sponges the eyes with 4 per cent sterile boric acid, wiping each eye with a separate sponge, the motion being away from the nose toward the outer canthus. In order to prevent gonorrheal infection of the eyes, known as ophthalmia neonatorum, Credé's method is used routinely in most places. Preparation for this method consists in having two sterile medicine droppers, or one and some sterile pledgets, a solution of 1 to 2 per cent silver

Credé's Method

nitrate, and normal saline solution. The method is: separate the eyelids gently with thumb and forefinger of one hand and with the other hand drop 1 or 2 minims of the silver nitrate solution from medicine dropper directly into each eye at the inner canthus; follow this with a few drops of salt solution, using eye pledgets or medicine dropper. Care must be taken that the silver nitrate solution is made up fresh every few days, otherwise there may be a severe reaction from its use.

The Care of the Newborn.

Care of Newborn Babe

Temperature of Newborn

The most important point in the care of the newborn baby is the maintenance of a normal temperature by keeping his body sufficiently warm. His temperature should be taken immediately after birth when it is usually one degree higher than his mother's, but it drops rapidly if there is any exposure as his heat regulating centers are very unstable. A crib with two hot water bottles (115° F. with covers) and warm blankets should be prepared for the newborn. As soon as he is breathing properly and the cord is tied, he should be wrapped in warm blankets, should be put into the crib, and should be taken to the nursery.

First Care after Delivery

The newborn is covered with a thick, white, waxy material (the vernix caseosa) which is composed of epithelial cells, lanugo, and sebaceous secretions accumulated during the intra-uterine life. He may be soiled with meconium, blood, and feces. There is less initial loss of heat if the child is not exposed for cleaning at this time. Without removing him from his bed, quickly anoint him with warm oil as soon as he is taken into the nursery. The oil is used at this time only to soften the vernix and other material which is on him. Take the temperature while giving the bath. Put a diaper around his buttocks and see that the cord dressing is held in place by a binder; wrap a blanket around his neck and shoulders and pin it; put another blanket under him, bringing it up over his head so that only his face is exposed; put hot water bottles

on each side of him and leave him for 6 or 8 hours. The above procedure should not take longer than 2 or 3 minutes. Do not leave the baby alone but watch him closely because he may become cyanotic and may have respiratory difficulties, due either to mucus in the throat or improper expansion of the lungs. If he is free from respiratory difficulty, he should not be touched for at least 6 hours. He must also be watched for bleeding from the umbilicus, which must be reported at once. Many authorities advise placing the newborn on his right side the first 24 hours of life. It was once held that this facilitated the closure of the foramen ovale, but this is no longer taught. A more plausible reason is that the weight of the liver may embarrass the heart in the first hours of life. At the end of 6 hours the temperature is taken again and 10 minutes is spent in giving the baby a cleansing oil bath. At this time he is weighed. Weighing him in his blankets and then subtracting their weight from the total saves exposure.

Watch Him Closely

Oils Which May Be Used

The best oil to use for cleansing is olive oil, but at present it is very expensive. Almond oil is also good but nearly as expensive. Benzoated lard, too, is very satisfactory and fairly cheap. Other oils which may be used are oil of peach kernels, cotton-seed oil, plain melted lard, Wesson oil, and Crisco. The oil may or may not be sterilized. The bath equipment, which consists of the following, may be placed on a tray 15 x 20 inches:

Cleansing Oil Bath

Equipment:

Equipment

1. Paper bag for waste.
2. Laundry bag for soiled linen.
3. Jar of sterile eye pledgets (made from best grade cotton the size of a marble).
4. Jar of sterile cotton pledgets made from second grade cotton (size of a walnut).
5. Jar of cord dressings, sterile gauze, 4 inches square.
6. Jar of sterile abdominal binders made from old cotton torn in strips, 12 x 6 inches, rolled like a bandage.
7. Jar of sterile toothpick applicators, cotton wound tightly around the ends.

8. Two small sterile basins, 2 to 4 inches in diameter, 1 for sterile boric acid solution (4 per cent), 1 for sterile oil.
9. One large basin of warm water in which to put small basins to warm their contents.
10. Tray of safety pins.
11. Handling forceps in glass of 5 per cent lysol solution.

Procedure This tray and equipment can be used for any number of babies whether they are bathed in their cribs or upon the table. To prepare a newborn for his oil bath wrap and pin the blanket around him to restrain his arms. With the handling

FIGURE 12. TOOTHPICK APPLICATOR USED IN THE BATH

Eyes forceps remove an eye pledget from the jar, dip it into the basin of warm boric acid solution, then replace the forceps, take the cotton pledget in the fingers of the left hand and with the palm of the right hand hold the baby's head to the right side, then with the thumb and forefinger of the right hand separate the lids of his right eye, holding them open by pressing the lids gently back against the frontal and maxillary bones. Do not make any pressure on the eyeball. With the pledget in the left hand clean the eye by wiping from the inner canthus toward the outer, thus preventing any discharge from one eye being carried toward the other. In the same manner wash the left eye, reversing hands and using a fresh pledget. Put soiled pledgets in the paper bag for waste.
Nose To clean the nose remove a toothpick applicator from the jar with the forceps, dip it into the basin of oil, replace the forceps, steady the child's head with one hand and with the other clean the external nares with the applicator. **Ears** The ears are cleaned with toothpick applicators dipped in oil, using a separate one for each ear, and cleaning only the external ear. The baby's mouth is not cleaned; the mucous membrane is very delicate and if injured is subject to such infections as thrush. **Face** To clean the baby's face use a larger cotton pledget (made of the second grade cotton). Remove it from the jar

with the forceps, dip it in oil, take it in the fingers, replace the forceps, and sponge the face and head; follow with a dry sponge to absorb the oil. **Body** Clean the body in the same way, dipping the sponges in the oil and wiping with dry ones. Only the part of the body which is being cleaned should be exposed at a time, the rest should be covered with a blanket. Note the order which should be followed: right arm, left arm, neck and chest, abdomen around the cord dressing (do not touch that), back, right leg, left leg, buttocks, and groin. The skin of the newborn is very tender, easily abraded, and is subject to infections if it is injured; therefore the nurse must not use too much pressure in her attempts to clean the vernix from the baby, for if it is not removed at the first bath it will be removed at the next, and it will do the baby less harm than overexposure and too rigorous rubbing. The original cord dressing is not removed or touched during the first bath or at any time unless it is soiled. **Abdominal Binder** An abdominal binder is put on to protect it and to hold it in place. This is changed every day during the bath or whenever it is soiled. If it is made of old cotton cloth it may be discarded when it is taken off. The binder, which may also be made of flannel, is pinned or sewed on the baby to one side of the front midline as the newborn usually lies on his side. The nurse should slip her finger under the binder when pinning it in order to prevent the possibility of pricking the baby or of having the binder too tight.

Clothing The shirt is then put on. The nurse puts her fingers through the sleeve of the shirt, takes the baby's fingers and hand in her fingers and pulls them through the sleeve. The diaper is pinned to the shirt in front and back to keep it in place. Stockings are put on and pinned to the diaper at the knees. The "gertrude" or petticoat is slipped inside the dress and the nurse puts both together over her right arm. With her right hand she takes the baby's legs and with the left hand she pulls the dress and petticoat from her right arm over the baby. His hands are put through the sleeves as directed

above; he is turned on his face, the "gertrude" is fastened on the shoulders and the dress is fastened in the back.

To Turn a Baby

To turn a small baby do not drag him into the desired position by pulling one leg and arm, but place the right hand over his chest, slip the left hand under his shoulders and neck, thus supporting the head with the tips of the fingers, and turn him quickly. If he has no clothes on, the nurse may turn him by placing her right hand in his groin, thumb toward the front and fingers behind over the lower back, her left hand over his shoulder, thumb in front and fingers behind, supporting his neck with her two first fingers.

For the first day or two the baby will need an extra blanket wrapped around him and if his temperature is below 98° F. he should be surrounded by hot water bottles.

When the baby is put into his crib, fold the dress and petticoat up away from his buttocks so that they will not become wet or soiled. Another way to prevent the outside clothes from being soiled is by the use of stork sheeting (8 x 14 inches), folded inside a diaper and placed under his buttocks under the dress and petticoat.

Feeding

In most cases the doctor allows the normal newborn to go to breast 6 to 8 hours after birth. On the first day the infant obtains the secretion known as colostrum which is composed of protein, fat, carbohydrate, mineral matter, and water. There is very little of it at first but the amount and character of the secretion change, so that by the end of the fourth or fifth day the breasts secrete normal breast milk in normal amounts. The newborn thrives well if nursed only every 4 hours or on 5 feedings a day, i.e., 6 A.M., 10 A.M., 2 P.M., 6 P.M., and 10 P.M., omitting the 2 A.M. feeding. In order to determine the amount taken at breast, the baby can be weighed before and after feedings. (See chapter on Breast Feeding.) The new baby is weighed regularly before the daily bath. The scales are kept on a side table in the nursery and the baby's towel is used on the scales as mentioned in a preceding paragraph.

Temperature

The newborn's temperature is taken twice a day, morning

and evening, with his individual thermometer. If it is over 100° or under 98° F., it should be taken every 4 hours. The pulse and respirations are not usually taken. (See Care of Thermometers, Chapter VI.)

Charts

Clinical charts should be kept for the newborn baby and on them should be recorded the temperature, weight, amount of milk taken at breast each time, the total 24 hour amount, and any unusual symptoms in regard to the child's condition.

To Mark Baby for Identification

Newborn babies and all small children in an institution must be marked for identification. There are various methods employed. A piece of adhesive 2 inches square upon which is written the child's name and hospital number can be put on his back between the shoulders. Since this comes off frequently it is not a desirable method. A wrist band is often used. This is made of linen tape about ½ inch wide and long enough to tie around the wrist; a piece of adhesive is folded over the tape at the middle, leaving the ends free to tie. The name and hospital number are written on the adhesive. But this too comes off, even though it is tied in a square knot. Another method is to take a piece of adhesive twice the length needed to go around the baby's wrist; cut and fold half of it to make a band to go around the wrist as shown in the diagram. Place the name on the unfolded section of the adhesive and fold it around the wrist band. It may be sewed on. In many places the baby's foot or thumb print is taken immediately after delivery or admission and filed with his record. This, however, is only for reference and some other data has to be combined with it to make it of value. One of the most popular methods used at the present time is a bead necklace with lettered beads spelling the infant's name strung in the center of the chain. Another method is to tie a labeled aluminum tag around the baby's neck with a piece of tape.

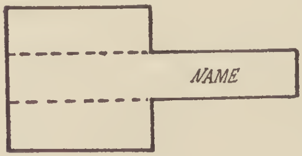

FIGURE 13. WRIST BAND.

After the newborn's cord is off and the umbilicus is healed, he is ready for a water bath. As stated above, a sponge bath given to him in his bed is the most practical and the safest method. His individual basin is filled with water (100° F.) and together with the bath tray, clean linen, and laundry bag is taken to the crib or to the common dressing table, as the equipment of the nursery permits. If he is bathed on the dressing table a clean towel is put over the pad on the table. After bathing each baby the rubber covering on the pad must be scrubbed with soap and water. The bath equipment is almost the same as for the oil bath; the cord dressings and binders are not needed, but the following additional articles are necessary: powdered soap, bath thermometer, a wash cloth of soft material, as old linen or an old piece of cotton which may be discarded after the bath, a linen towel, and warm oil to be used in the creases instead of powder. The routine for the water bath is the same as for the oil bath. The eyes are first washed with boric acid solution; next, the ears are cleansed with toothpick applicators dipped in boric solution or in bath water; and then, the nose is cleansed with applicators dipped in boric solution or in oil if there is any nasal secretion. The face is sponged with clear water and dried by patting. The nurse wets her hand in the water, sprinkles soap in her palm, and lathers the hair. Taking the baby on her left arm, with the back of the head held in the palm of her hand and his back and neck supported by her arm, she holds him over the basin of water and with the right hand rinses the hair, being careful not to get water or soap in his eyes and ears. (Hold thumb and forefinger over ears.) The head may be rubbed briskly except directly over the fontanelle. Next, the nurse unpins the blanket in which the baby is wrapped, makes a lather in the hand and rubs it over the body. The body is sponged in this order: arms, neck, chest, abdomen, back, legs, and groin. (See that all the soap is removed, because it is irritating to the skin, paying particular attention to the folds and creases, as the axilla, groin, and palms of the

Water Bath

Sponge Bath

Equipment

Procedure

hands.) The body is dried by patting it with a towel for the baby's skin is too tender for rubbing. A little oil, instead of

FIGURE 14. METHOD OF LIFTING THE BABY FROM THE TABLE TO THE BATH TUB

powder, can be used in the creases and folds where any two surfaces rub, for powder cakes and forms little irritating granules. If powder is used, only zinc stearate is advised. The

child is dressed according to the preceding directions. A tub bath may be given the baby if individual tubs are available. The routine is the same as for the sponge up to the time the **Tub Bath**

Figure 15. Position of Baby in Bath Tub

baby's body is soaped. He is then put into a tub of water 100° F. To do this the nurse places her left hand under his shoulders and supports the head and neck; with her right hand she holds his feet and lifts him into the tub of water. Still sup-

porting him with her left hand, slipping her second finger under his left axilla to hold him better if he struggles, she bathes him with her right hand. She must be sure that all the soap is rinsed off. A shower bath also is used to bathe the baby The routine is practically the same as for the tub and sponge. A pad is placed on the bath slab to put the baby on. His head and body are soaped as before, or a soap container filled with soap solution may be hung over the slab and a rubber tubing with a stopcock may convey the soap solution to the child's body. The spray may then be turned on, the nurse being careful to keep her hand on the end of the spray so as to feel the temperature of the water before it touches the baby. She must also be careful not to spray with too much force and not to get water in his eyes and ears. She can turn his head away from the spray with one hand and can operate it with the other. After the shower, he should be wrapped in his blanket and towel and taken to his bed or to his dressing table.

Shower Bath

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CHAPTER VIII

THE PREMATURE BABY

When to Give Premature Care

Premature care should be given:

1. Any baby weighing less than 2300 grams at birth.
2. Any baby born prematurely.
3. Any baby suffering from malnutrition whose weight is that of a premature baby.
4. Any baby whose temperature is subnormal or unstable as in cases of athrepsia.

Essential Factors in Care of Premature

Essential factors[1] to be considered in the care of the premature are:

1. The maintenance of body heat with a supply of fresh air.
2. Proper feeding—breast milk.
3. The prevention of infection.
4. Control of imperfect respirations.

The mortality of premature infants is very high. It is estimated that 80 per cent of those weighing 1600 grams at birth, 40 per cent of those weighing less than 2000 grams, and 20 per cent of those weighing less than 2500 grams die.[2] The longer the period of gestation and the larger the infant, the better is his prognosis.

Characteristics of Premature

The picture of the premature infant in the early days of life is quite characteristic. In addition to his very small size, he shows in varying degrees an absence of the life and vigor which is seen in the fully developed infant at term. He is emaciated, his skin being soft and wrinkled, and showing very little subcutaneous fat. His head is large, his abdomen is broad and distended, and his limbs are puny. According to the stage of his development he may or may not have the

[1] Griffith, J. P. Crozer, M.D., "Diseases of Infants and Children."
[2] Sheffield, Herman B., M.D., "Diseases of Children."

remains of hair (lanugo) on his body which was present in uterine life; and in like manner his nails may or may not be well formed. His face has a senile expression and he is torpid and extremely somnolent. His eyes are closed; his cry is feeble; the surface temperature is usually cool; the extremities seldom move. The respirations are very superficial and irregular, often ceasing for a few seconds. The power to suck and even to swallow is often slight. These signs evidently indicate that the vitality is very low. If the weight is below 3 or 4 pounds and if the length is less than 18 or 19 inches, it indicates that the organs are not developed sufficiently to function, and that unless unusual care is taken in the treatment of such cases, they will die.[3]

Poor Heat Control

The premature's heat regulating center acts poorly, and as a result he is very sensitive to external heat and cold. The relation between the body surface and the weight is important in determining the loss of heat, for the greater the body surface in proportion to the weight, the greater the radiation of heat. The relation between the body surface and the weight of a normal baby is about three times that of the adult, and that of the premature is even greater. Therefore it is necessary to provide more external heat and more food, more calories per kilo to make up for this greater loss.

Digestive Organs

The digestive organs are subject to upsets. The child may not have the strength to nurse and may not be able to swallow. Breast milk is essential. (Dr. J. P. Sedgwick, Minneapolis.)

Susceptible to Infections

The premature's vitality and resistance are low; he is unusually susceptible to infections, especially respiratory infections. No one with any kind of infection should go near him. If colds or upper respiratory infections are prevalent, it is best for every one who goes near him to wear a mask over the nose and mouth. No one except those caring for him should be allowed to touch or see him at any time. The premature's room may have the upper half of one partition of glass; visitors may observe him through this.

[3] Dunn, Charles H., M.D., "Pediatrics."

Atelectasis The premature's lung tissue is often not fully expanded, a condition known as atelectasis, so that he is subject to cyanotic attacks and difficult respirations. The respirations may be shallow and irregular. Therefore it is important that the air he breathes should be fresh and should have a full supply of oxygen. It may be necessary to furnish oxygen to keep the blood supplied. There should be an oxygen tank ready for instant use as part of the equipment of the premature room.

To Maintain Body Heat The air which the premature breathes should not be below 68° or 70° F.; it should be always fresh, with a humidity of 55 per cent. He should be allowed 1000 cubic feet of air space. Incubators were formerly much used; they were found complicated and unreliable unless constantly watched; the ventilation in them was usually poor and the humidity too low. Their use is gradually being abandoned. Many hospitals have a room especially equipped for prematures. Such a room is provided with a heat regulating and ventilating apparatus, so that any desired temperature and a generous supply of air may be maintained. While the temperature of such a room is supposed to be regulated by a thermostat, it does not always prove reliable and it means constant supervision. It is difficult also to maintain the desired humidity. Also it is unpleasant for a nurse to remain long enough in such a warm room to take proper care of the baby. Dr. Julius H. Hess of Chicago has designed a special premature bed shaped like a large basket, lined with a water chamber which is heated by electricity.[4] This is safe; it eliminates much of the nurse's work; it is simple to operate; it allows good ventilation of fresh air with the humidity a little lower than that of the surrounding air. A very simple, cheap, and satisfactory premature bed may be made from a clothes basket the same size and shape as the above container, about 30 inches long, 22 inches wide, and 18 inches high. This is elevated from the floor on a stand. The inside and bottom are covered with 2 or 3 thicknesses of newspaper and a large

Incubator

Warm Room

Premature Bed Designed by Dr. Hess

Clothes Basket

[4] Hess, Julius H., M.D., "Principles and Practice of Infant Feeding."

sheet is draped around the inside to cover it. Two large sheets, folded crosswise in the middle, are placed over the top of the basket with the center fold of each one in the middle of the basket, and with a 2-inch opening between the two. The ends of each sheet are folded neatly around the outside, making square corners and are held in place by safety pins. A hair pillow protected by a rubber is put in the bottom of the

FIGURE 16. BASKET FOR PREMATURE BABY

basket for a mattress and a small cotton sheet is put over it. The covering over the top of the basket prevents draughts from reaching the baby and also prevents droplet infection. The opening is large enough to furnish ventilation and to allow the nurse to care for the child in his basket. A small infant's crib, much the same size and shape as the clothes basket, may be arranged in the same way and is just as satisfactory. (See note 3.) An old dry goods box, the same size and shape, can be used if a basket cannot be obtained.

Premature Room

There should be a special room devoted to the prematures.

This should be quiet; it should have good ventilation and plenty of sunlight. The temperature should always be from 68° to 70° F. and the humidity should be 55 per cent. No one but the nurses and doctors who actually care for the baby should be allowed in this room, and no one with any upper respiratory infection should be admitted. If there is more than one premature in the room there should be a screen between the baskets, or, better, a glass partition. The room must be large enough to allow 1000 cubic feet of air space to every baby.

Temperature Humidity

Cubic Feet of Air Space

The premature should have his complete individual equipment as the normal baby has; this may be kept in a table beside his basket. Everything is done for him in his basket so that there is no need for a common dressing table.

Aseptic Nursing Technique

The nurse, not the maid, should be responsible for the cleaning of the room when there are babies in it. Once a day the floor should be brushed, with a sweeping compound or damp sawdust, so that there will be no dust. Dusting should be done with a damp cloth.

To Clean Room

Clothing for the Premature.

Clothing

1. Flannel band.
2. Cape made of all wool best grade flannel (illustration).
3. Piece of old flannel for a diaper with a small piece of absorbent cotton inside to absorb the urine.
4. Flannel wrapping blanket 36 inches square.
5. Comfort filled with lamb's wool and protected by an outing flannel cover made like a pillow case.

The baby is dressed in the band which is put on in the regular way, the flannel diaper, and the cape which is adjusted by the string in the hood and pinned snugly around his shoulders. The wrapping blanket is placed under him and is brought up over his head and body, leaving only his face exposed. A thermometer (bath) is hung inside the basket on the same level as the baby; this is to record the temperature of the basket which usually has to be between 70° F. and 80° F.

Temperature of Basket

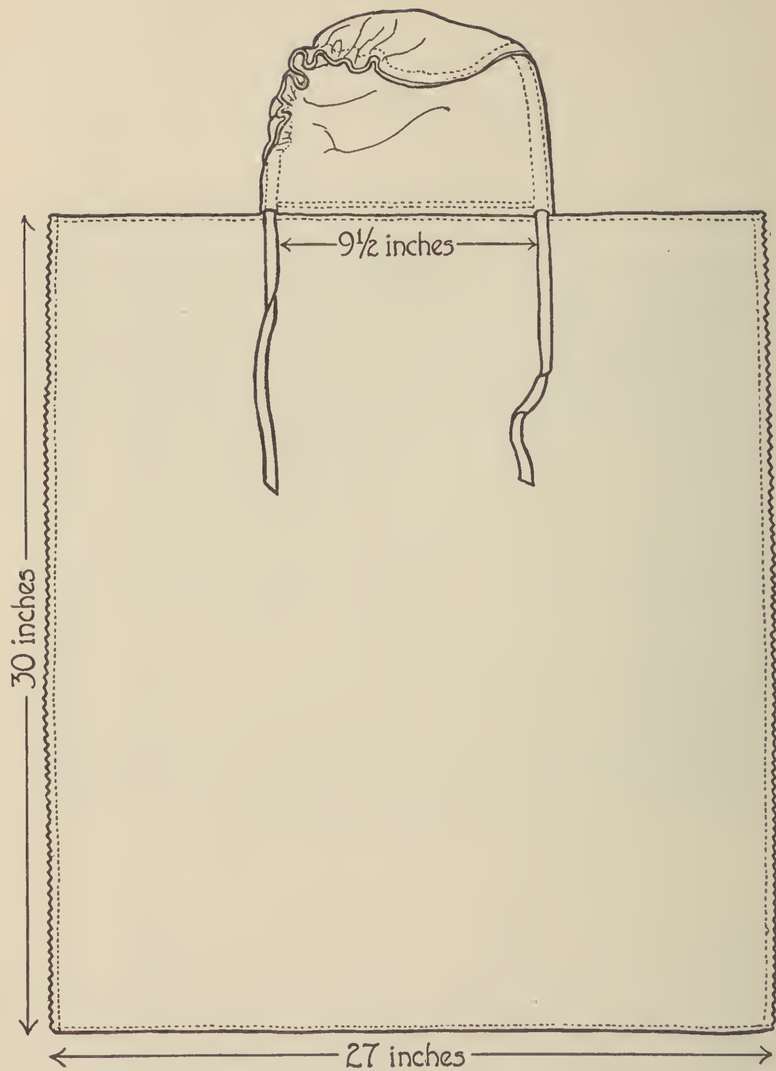

FIGURE 17. FLANNEL CAPE FOR PREMATURE BABY

The bath thermometer to record the basket temperature may be placed over the baby between his cape and the first wrapping blanket; here the temperature should be 80° F. to 90° F. With both methods it varies with the individual baby; it also varies with the same baby as he becomes older and becomes better established. It has to be worked out for a new baby, the problem being to keep the inside of the basket at the temperature which will cause him to have a body heat of 98.6° to 99° F. This is recorded on the chart with the premature's temperature every 4 hours. This basket temperature is maintained by the use of as many hot water bottles as are necessary. It is advisable to start with 3, at 115° F. (never warmer), protected by covers. These are put one at the feet and one at either side of him outside the wrapping blanket. If the bath thermometer is placed in the blankets around the child, be sure that the end of it is not near a hot water bottle. The wool comfort is spread over all, baby and bottles, and is tucked in. The hot water bottles are filled as often as necessary; start by refilling one every hour. It may be necessary to change them more often and maybe not so often. Every baby's needs have to be determined individually.

Hot Water Bottles

Temperature

The premature's temperature should be 98° F. to 99° F.; it is difficult to keep it even as his heat regulating centers are very unstable and he quickly responds to slight variations of the surrounding temperature. His temperature is taken and recorded every 4 hours, never oftener, as he should be handled and exposed as little as possible; he is not taken from the basket to have this done.

Watch for Cyanosis and Irregular Respirations

He is observed every few minutes to see that he is not cyanotic. It may be necessary to remove him from the basket to resuscitate him. If possible give him artificial respirations while he is in the basket.

Daily Bath

He is cleaned daily with warm oil, never water, following the routine for oiling given under the care of the newborn (Chapter VII). Individual equipment is used; he is oiled

without being removed from his basket, here again endeavouring to expose him as little as possible. The nurse's hands must be warm when she cares for him. All clothes must be warmed before they are put on him. His diaper is changed every 4 hours (at the time his temperature is taken) and his buttocks are cleaned with warm oil. He is changed in his basket. He is

Daily Weight

weighed daily; this is the only time in the 24 hours that he is taken out of his basket. In the morning before giving him his oil bath, the scales are balanced, a clean towel is placed on them, and the baby in his soiled clothes is put on them and is quickly weighed; he is put immediately into his basket and the weight is computed and is recorded. During the oil bath the clothes are changed and the soiled ones which he had on when he was weighed are weighed and their weight is subtracted from the total.

Method of Feeding

The premature may be fed by one of several methods:

1. By gavage.
2. With a medicine dropper.
3. With a Breck feeder.
4. With a spoon.

The last three are more commonly utilized but are difficult to use, particularly in the younger premature who has little

Gavage

or no swallowing reflex. Gavage is quick and accurate, uses none of the baby's energy, and is attended by even less retching and vomiting than the other methods. The gag reflex is so little developed that he will often not waken when the tube is being passed. For this reason all prematures at the University Hospital, University of Minnesota, are routinely fed by gavage. (See directions for gavaging, use of medicine dropper, and Breck feeder, Chapter XIX.) A No. 8 to No. 10 French catheter is used for the gavage; it is inserted 3 to 5 inches. A Nelaton catheter is advantageous because it is marked in centimeters or inches and its position may be

Breast Milk a Necessity

estimated at all times. (See note 4.) Breast milk is the only food that can be given a premature with safety; it is abso-

lutely necessary for him if he is to survive. Food is generally first ordered at the end of 12 to 24 hours after birth; the amount depends on his size, usually 5 or 10 c.c. every 4 hours (Dr. J. P. Sedgwick, Minneapolis); it may be diluted half with water. At the beginning no attempt is made to fulfill his caloric needs but the amount is increased as rapidly as his condition will allow. Vomiting is the first sign that his tolerance has been exceeded. Ordinarily it may be increased 5 c.c. every day or every other day until he is having a sufficient number of calories per kilo to fulfill his needs. The premature needs more calories per kilo than the normal baby; in most cases 120 to 150 are needed to make him gain steadily. It may be 10 days to 2 weeks before his food can be increased to the required amount. Therefore he cannot be expected to gain as soon or as rapidly as the normal baby. He usually loses more in proportion to his weight, is slower in regaining his birth weight and in starting to gain. If he has regained his original weight at the end of 3 weeks he is doing as well as can be expected. Water may be ordered halfway between feedings; this is always best given by gavage. Only water is usually ordered for the first 12 to 24 hours.

Caloric Needs

Water

Turn Frequently

The premature baby must be turned from one side to the other every 4 hours after he is fed, as the normal baby is, for he lies so quietly and moves so little that his head may grow very narrow from lying constantly on one side. He should also be made to lie on the back of his head part of the time every day. He will not do this unless he is propped in this position; 2 pads of cotton can be made and put on either side of his head to hold it in this position for a few hours daily.

Daily Routine

According to the above routine the premature's temperature is taken and he is changed and fed every 4 hours. Everything is done for him at one time, then he is left alone until the next time they are due. He sleeps in the interval, seldom waking or crying.

When to Discontinue Premature Care

The premature is nearly always ready to come out of his basket and receive normal care about the time the mother was

due to have been delivered if the baby had not been born prematurely. For example, if he were born at 7 months, he will be ready to come out of his basket in 2 or 2½ months provided his gain has been satisfactory and his temperature has remained stable for at least 2 weeks. As he grows older he will not need 3 hot water bottles, and these may be taken away one at a time as his temperature permits, until there are none left. Also he will be able to suck a nipple and he may be accustomed to it by giving him one feeding a day with the nursing bottle and gradually increasing until he uses it entirely. Experience has proved (University Hospital, University of Minnesota) that little difficulty is met in teaching a baby to nurse or suck a bottle when the gavage is omitted, even when it has been used for several months.

Mother Expresses Breast Milk

The premature's mother should express her milk according to routine after delivery (see Chapter X), that is, every 4 hours, starting as soon as the milk comes and the engorgement is over. This milk may be fed her baby by gavage. When she is able to be discharged from the hospital, she may go home and send in daily her expressed breast milk to the baby. She should receive full instructions regarding the technique of expressing regularly every 4 hours, the care of her hands, the care of her breasts, the utensils used, and the care of the milk (to keep it on ice). When the baby is strong enough to nurse, she should come to the hospital once a day at least, and as much oftener as possible, to nurse him. If arrangements can be made for her to be there at every nursing time it is desirable.

CHAPTER IX

NUTRITION OF INFANTS AND CHILDREN

Necessity of Knowledge of Nutrition

A. *Proper nutrition* is essential for the maintenance of life and for the normal growth and development of the child. A thorough, accurate knowledge of the principles of nutrition in relation to infants and children is the most important branch of pediatrics.[1] Statistics show us that one-fourth of the civilized race die during the first year of life, and that 60 per cent of the deaths are due to nutritional disturbances, while a large proportion of the other 40 per cent is primarily dependent upon impairment of the infant's condition by improper feeding.[2]

Malnutrition

B. *Malnutrition*[3] is the low condition of health and body substance often accompanied by disease and for which it maintains an open door. It is nature's danger signal. Any child who is 10 per cent underweight for his height and who is not gaining at the normal rate is suffering from malnutrition.

Prevalence

The prevalence of malnutrition among children in America and other countries is appalling.[4] Dr. Wood estimates that between 15 per cent and 25 per cent of our American school children are unnecessarily undernourished. It is a surprising fact that the children of rich and well-to-do families are quite as defective and underweight as the children of the poor. The standard of the children of rural schools has been found to be even lower than that of the city schools.[5]

[1] Holt, L. Emmett, M.D., "Diseases of Infancy and Childhood."

[2] Hess, Julius H., M.D., "Principles and Practice of Infant Feeding."

[3] Pearce, N. O., M.D., "Malnutrition, Its Prevalence, Cause, and Treatment." *Journal-Lancet*, Aug. 15, 1921.

[4] Wood, Thomas D., M.D., "War's Emphasis on Health Education." *N. Y. Times*, April 18, 1918.

[5] Wood, Alice H., Director Elizabeth McCormick Fund of Chicago, "Building up the Malnourished Child." *Public Health Nurse*, Dec., 1921.

Causes

The causes of malnutrition as given by Dr. W. R. P. Emerson of Boston are:

1. Lack of home control.

2. Physical defects, particularly obstruction of the breathing passages. The removal of these physical defects to make the child "free to gain" should precede the work of nutrition or health classes.

3. Overfatigue from lack of sleep or other causes, overstimulation, preparation for classes required after school hours, "movies," and nervous excitement of all kinds. These conditions are quite as disastrous in their effect on the children of the well-to-do families as are the crowded manner of living and the noise of the tenement homes on less fortunate children.

4. Defective feeding. Under this head may be put lack of food, improper and faulty food habits, i.e., eating too fast or under wrong conditions, eating when overfatigued, etc.

5. Faulty health habits, for example, insufficient fresh air, lack of cleanliness, too little sunshine, or too little playtime out-of-doors.

Treatment

The *treatment* of malnutrition consists in finding the cause and in eliminating it. As long ago as 1910 Dr. Emerson started a nutrition clinic in Boston, and since then nutrition or health classes have been established in many other cities. Conditions can be remedied only by close coöperation between the parents, the school teacher, and the physician, all working together for the well-being and interest of the child.

Function of Food

C. *The function of food:*[6]

1. It furnishes the materials for the growth and repair of body tissues.
2. It furnishes heat and energy by combustion or oxidation.
3. It regulates body processes.

Definition of Food

Food is any material which consists of such elements as can be digested and absorbed and thus utilized by the body to

[6] Rose, Mary S., "Laboratory Hand Book of Dietetics."

enter into its structure and growth and to afford energies for its activities. The chief elements which food must supply are carbon, hydrogen, oxygen, nitrogen, sulphur, phosphorus, iron, sodium, potassium, calcium, magnesium, and chlorin. There are certain combinations of these elements which are available for the welfare of the body. These are: **Composition**

1. Protein.
2. Carbohydrate.
3. Fat.
4. Water.
5. Ash or mineral salts.
6. Vitamins. (See Note 2.)

Protein Composition

1. *Protein* contains nitrogen, carbon, hydrogen, oxygen, sulphur and phosphorus. It is essential to life because:

Function

a. It is the only food which contains nitrogen and can replace the continuous nitrogenous waste of the structures of the body.

b. It is necessary for cell growth.

c. It furnishes fuel for part of the dynamic loss. The most easily digested form of protein is that supplied by milk; the protein of mother's milk supplies the needs of the infant and that of cow's milk is readily digested later on in childhood.

Carbohydrate Composition

2. *Carbohydrates* are composed of carbon, hydrogen, and oxygen and are found in compounds known as starches and sugars. These cannot replace the nitrogenous waste of the body since they are devoid of nitrogen, but they are efficient sparers of protein.

Function

a. They are the most important sources of energy.

b. They are stored in the liver and muscles as glycogen.

c. They are partly converted into fat and deposited in the subcutaneous tissues, thus causing increase in weight.

Fat Composition

3. *Fats* are composed of carbon, hydrogen, and oxygen.

Function

a. They may be termed the storehouse of energy.

b. They help to regulate the body temperature.

c. They save the nitrogenous waste and increase the body weight.

Water Composition 4. *Water* is composed of hydrogen and oxygen. It is present in varying amounts in all food materials with the exception of a few fats, starches, and sugars. All cells need water.

Function

a. It is necessary for the solution of certain parts of food such as sugars, salts, and some of the proteins, and for the suspension of other proteins and emulsified fat.

b. It carries nutritious material into the blood, lymph-cells, etc.

c. It is needed for the elimination of waste products and of toxins from the lungs, skin, and kidneys.

Salts Composition 5. The chief *mineral salts* are compounds of sulphur, phosphorus, chlorin, sodium, potassium, calcium, magnesium, and iron.

Function

a. They are required for growth and normal cell activity.

b. They are necessary in digestion, and in every step of metabolism from absorption to excretion and secretion. As a rule they are present in sufficient amounts in the usual articles of food.

Vitamin Definition 6. *Vitamin* (see note 2) is the term applied to those accessory food substances whose presence is essential to growth and maintenance of normal nutrition. (Term "vitamin" **Composition** coined by Dr. Funk.) Their chemical composition in indefinite, but it seems probable that they contain basic nitrogen. Their mode of action is unknown, but they are of such importance that their absence produces definite symptoms and **Function** the development of certain "deficiency diseases," as, for example, scurvy and beriberi. There are at least three known types of vitamins occurring in different foods.[7] They are found chiefly in natural foods such as seeds, leaves, tubers, edible roots, fruits of plants, fruit juices, animal tissues, such

[7] Hess, Alfred H., M.D., "Newer Aspects of Some Nutritional Disorders." *Journ. Am. Med. Assn.*, March 12, 1921.

as muscles and glandular organs, likewise in milk, human milk included, butter, eggs, and cheese. Yeast also is rich in vitamins.[8]

Calorie

D. It is customary to express the *energy value of food* in heat units or calories. A large calorie is that amount of heat energy required to raise 1 liter of water from 0° C. to 1°C.[9] Heat is produced by chemical action, friction, mechanical movement, in the utilization of food by the animal organism, and by the oxidation of protein, fat, and carbohydrate. It has been determined by experiments carried out under properly controlled conditions just how much heat is produced by the combustion of practically all food substances.

1 gram of fat yields 9.3 calories.
1 gram of carbohydrate yields 4.1 calories.
1 gram of protein yields 4.1 calories.

The term metabolism covers all the functions of the body which have to do with the preparation for and the assimilation of food. (See note 2.)

To Calculate Caloric Requirements of Children

E. In calculating the total *caloric requirement* of children there must be taken into account: [10]

1. Basal metabolism requirement.
2. Growth needs.
3. Needs for muscular activity.
4. Food values lost in excreta.

Basal Metabolism

1. The basal metabolism of children is higher and more intense than that of adults. They, therefore, require food in higher proportion to the body weight than the adult. The basal requirements (Benedict and Talbot) are highest per kilo at about 9 months, and steadily fall from this time up to adult life. They are fairly uniform in children of the same weight.

[8] McCollum, E. V., "Part Played in Diet by Food Substances of Unknown Chemical Nature," "Oxford Medicine."

[9] Bayliss, Professor W. M., "Physiology of Nutrition." *Practitioner.* July, 1919.

[10] Holt, L. Emmett, M.D., Fales, Helen, "Food Requirements of Children; I. Total Caloric Requirements." *Am. J. Dis. Child.*, Jan., 1921.

Process of Growth

2. Children are in the process of growth; their bodies are daily increasing in size; they demand additional quantities of all types of foodstuffs for use in the formation of the increasing mass of tissue. Since protein contains nitrogen which is essential for growth, it is a most necessary part of children's diets.[11] The variation of this growth rate is fairly uniform in all children. The requirements for growth are greatest during the periods when growth is most active, namely, during the first year and during adolescence. They are nearly uniform from 6 to 12 years.

Muscular Activity

3. The muscular activity of children is greater than that of adults so the energy requirements are also greater. Muscular activity, however, varies enormously with different children, but, in general, tends to increase from birth to puberty.

Foodstuff Lost in Excreta

4. The caloric value of foodstuff lost in excreta is subject to very little variation in healthy children of the same age living under similar conditions.

Caloric Requirements of Children

F. Caloric requirement of children who are underweight is greater per kilo than is that of those who are of average weight according to their ages. Children who are overweight require fewer calories per kilo. Caloric needs are greatest during the periods of greatest growth, during the first year and during adolescence. During the latter period more calories are required than for an adult. As the growth needs end, the calories are reduced to the adult standard.

Following is a table of caloric needs (see note 2):

Table of Caloric Needs

Age	*Calories per kilo*
Average infant under 2 months of age	65 to 100
Average infant over 2 months of age	100 to 120
Premature infant and thin infant under 2 months	110 to 140
Thin infant over 2 months depending on general condition	120 to 150
6 months to 12 months	100
12 months to 24 months	90

[11] Holt, L. Emmett, M.D., Fales, Helen, "Food Requirements of Children; II. Protein Requirements." *Am. J. Dis. Child.*, Oct., 1921.

Boys (See note 10.)

6 years until after growth is complete	80
After growth is complete (usually 15 years)	48

Girls

6 years	76
10 years	80
After growth is complete (usually 15 years)	44

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CHAPTER X

MATERNAL NURSING

Importance of Maternal Nursing

Maternal nursing should be the keystone of propaganda for the prevention of infant mortality and for the foundation of good health.[1] Breast milk, one of the most precious of substances, is the only natural and ideal food for infants.[2] It contains all the necessary food elements in the proportion best suited to them and their developing digestive organs. Statistics show that during the first year of life the mortality of artificially fed babies is six times greater than that of breast fed babies, 80 per cent of infantile deaths occurring among the former. The morbidity also of artificially fed babies in infancy and in later childhood is many times greater than that of breast fed babies. Breast milk confers a certain degree of immunity to disease from the mother to the child.[3] Therefore it is every infant's right to have breast milk, and it is every mother's duty and privilege to nurse her baby. Authorities as Jacobi, Sedgwick, Griffith, and others claim that there is no such condition as agalactia, and that at least 95 per cent of mothers are able to nurse their babies if they are given proper prenatal care and supervision and instruction after delivery.

Some Contra-indications to Nursing

A. Some contra-indications to nursing are (see note 3):

1. Open tuberculosis in the mother is a contra-indication to nursing, because of the danger of infecting the child. If breast milk cannot be obtained for him from other sources, the mother may express her milk and it can be boiled and fed to him.

2. Any grave constitutional disease in a mother, such as

[1] Sedgwick, J. P., M.D., "Maternal Nursing."

[2] Holt, L. Emmett, M.D., "Diseases of Infancy and Childhood."

[3] Hess, Julius H., M.D., "Principles and Practice of Infant Feeding."

chronic heart disease, insanity, etc., may demand weaning the baby.

3. a. An acute communicable disease, as scarlet fever, diphtheria, typhoid, etc., does not indicate weaning. For a time there may not be enough milk and then the temporary addition of some milk mixture may be necessary, but the mother's breasts should be stimulated by regular manual expression, then, after the acute stage of the disease is over, the baby should continue nursing.

b. If the mother has an upper respiratory infection and she is otherwise in good condition, she may continue to nurse the baby, but she should wear a mask over her nose and mouth while doing so.

4. Menstruation occurring during lactation is not an indication for weaning.

5. Another pregnancy occurring during lactation usually demands weaning, but not necessarily at once if the mother and the baby at breast are thriving.

6. If the mother has mastitis the baby may continue to nurse unless he actually draws pus from the nipple, and if the abscess is located so that the baby does not come in direct contact with it thereby becoming infected by it. In case of either of the above conditions the milk should be expressed, boiled, and given him from a nursing bottle.

Composition of Breast Milk

B. Composition of breast milk:

Colostrum

The secretion of the first few days of lactation is called colostrum. It is less sweet in taste than the later milk and its proportions are different. It has a very high content of protective antibodies, an even greater proportion than the later breast milk. (See note 2.)

Average composition of colostrum

Fat	2.38%
Carbohydrate	3.38%
Protein	8.60%
Ash	0.37%
Water	85.27%
	100.00%

The composition of colostrum gradually changes, until by the end of 5 or 10 days it has assumed the character of normal breast milk, which is of a bluish white color, odorless, and sweet in taste. (See note 2.)

Breast Milk

Average composition of breast milk

Fat	3.5 %
Carbohydrate	7.5 %
Protein	1.25%
Ash	.2 %
Water	87.55%
	100.00%

In addition to the above composition, breast milk contains immunizing bodies which are contained in the mother's blood and are transmitted to the baby through her milk. They are of value for protecting the infant against infections. (See note 3.)

Quantity of Breast Milk

C. Both the quality and quantity of breast milk of different women vary greatly. Also the breast milk of an individual woman varies considerably at different times during the 24 hours as well as at different periods of every nursing. The quantity secreted by the breast during the first few days of an infant's life is very small. On the first day 10 to 20 c.c. of colostrum are secreted, and on the second day 80 to 100 c.c. The amount gradually increases.

Average daily quantity of breast milk.

At end of 1st week	300 to 500 c.c.
During 2d week	400 to 550 c.c.
During 3d week	430 to 720 c.c.
During 4th week	500 to 800 c.c.
From 5th to 13th week	600 to 1030 c.c.
From 4th to 6th month	720 to 1150 c.c.
From 6th to 9th month	900 to 1220 c.c.

Hygiene of Nursing Mother

D. Hygiene of the nursing mother:

Nursing should not be made a burden to the mother. It is a normal function and she should be permitted to carry it out along natural lines. (See notes 1 and 3.)

1. Diet (see notes 1 and 3):

A nursing mother need not restrict her diet. She should have a well balanced diet of plain nutritious food, eating the same kinds of food to which she has been accustomed before lactation, and the same food that it is proper for any woman to eat. There should be an increase in the amount taken, and a reasonable addition of fluids to accommodate the loss made by the milk.[4] (See note 1.)

2. Bowel function. **Bowel Function**

The nursing mother should have one free evacuation of the bowels daily. (See note 3.)

3. Outdoor exercise, work, and sleep (see note 3): **Exercise**

The nursing mother may do a reasonable amount of light work daily, being careful not to become overfatigued. She should spend 3 to 4 hours daily in the open air in mild exercise. She should sleep at least 8 hours out of the 24, and a nap of 1 or 2 hours during the day is advisable. **Work** **Sleep**

4. A nursing mother should avoid worry or excitement, for a tranquil mind is an important factor in maintaining sufficient breast milk. (See note 3.) Anger, fright, worry, shock, sorrow, etc., may have a striking effect on the quantity and quality of her milk. **Worry** **Excitement**

5. The mother should observe absolute regularity in all things and especially in nursing the baby. **Regularity of Habits**

6. She should be temperate in all things.

E. Care of the breasts:

1. The mother's breasts should be sponged before and after nursing with sterile water 100° F., and should be wiped dry. A breast support may be applied loosely.[5] This is only a support and to hold sterile gauze squares in place over the nipples. A breast tray is desirable, especially in a hospital. **Care of Breasts** **Breast Tray**

[4] Shannon, Ray, M.D., "Demonstration of Food Proteins in Human Milk by Anaphylactic Experiments on Guinea Pigs." *Am. J. Dis. Child.*, Sept., 1921.

[5] Larman, C. L., M.D., "Heavy Breasts as a Factor in the Production of Faulty Posture." *Journ. Am. Med. Assn.*, Jan. 21, 1922.

2. It should contain:

   a. Basin of warm sterile water.
   b. Jar of sterile cotton pledgets.
   c. Handling forceps in 5 per cent lysol solution.
   d. Kidney basin or paper sack.
   e. Jar of sterile gauze squares (3 inches square).

To Sponge Breasts

3. To sponge the breasts, remove a cotton pledget from the jar with the sterile forceps, dip it in the jar of water and sponge the breast with it, beginning at the end of the nipple and sponging away from it and down over the breast. Wipe the breast dry with another sponge. After the baby nurses, sponge the breasts again and wipe them dry, putting a sterile gauze square over each nipple and fastening the breast support loosely around them.

Cracked Nipples

Nipple Shield

4. If the nipples are cracked or fissured so that the nursing is painful for the mother, a shield may help. (Slemon's nipple shield is best—Dr. J. C. Litzenberg.) To use this, fill it with expressed milk or warm water and place it over the mother's nipple. There will thus be less difficulty in making the baby nurse through it. The shield is undesirable because (1) it makes it more difficult for the baby to obtain sufficient milk and because (2) the breasts are not sufficiently stimulated when it is used. It is generally used only for the first few minutes of the nursing period until the flow is well started. The baby can then nurse directly from the breast without causing too much discomfort to the mother. If a nipple is cracked so that it bleeds and the baby obtains blood with the breast milk, it may make him vomit; then nursing from that breast may be discontinued temporarily. It should be thoroughly emptied by manual expression at regular intervals, since this does not cause the pain which the baby's nursing does. The child may continue to nurse from the other breast until the fissures are healed, which takes only a day or two.

Lead Nipple Shield

A metallic or a lead nipple shield worn over a cracked nipple between nursings may give relief. Various medica-

tions may also be used. Balsam of Peru and castor oil in equal parts have been found beneficial. Cracks are sometimes touched up with silver nitrate. (Dr. J. C. Litzenberg.)

Inverted Nipples

5. Inverted nipples cause great difficulty in nursing. Proper prenatal supervision may help if the mother is instructed to draw them out by manipulation before delivery. During the last three months of pregnancy she may be instructed to thoroughly wash her hands and, using sterile olive oil or cocoa butter, to gently massage the nipple to draw it out. A breast must not be massaged; there is never any indication for it. Ice-caps are given for relief for engorged breasts. A nipple shield will also help, but it cannot be used over a long period of time. Usually a robust baby who nurses vigorously will draw out the nipple very soon. (Dr. J. C. Litzenberg.)

Technique of Nursing

F. Technique of nursing:

Position When Mother Is in Bed

1. Position: When the mother is in bed, she should lie on the side from which the baby is to nurse with her arm under her head and not under the baby's neck. He should be flat on the bed on his side and on a level with the breast from which he is to nurse. The mother should see that her breast does not come against his nose, as a large breast will often obstruct the child's respirations and will cause difficult nursing. She should be quiet and composed during the nursing period. The baby will react to nervousness or excitement, often refusing to nurse for no other reason.

When Mother Is Sitting Up

When the mother is sitting up, the child's head may rest on her knee, which is raised by the use of a foot stool. She supports his neck and body with her arm and he nurses from the pendulous breast of the same side.[6] If milk comes too rapidly this way, the baby may be held higher on the mother's arm so that he is on a level with her breast. If a normal baby regurgitates after nursing, it is often caused by his belching gas. To avoid this instruct the mother to hold him up over her shoulder and

[6] Grulee, C. G., M.D., "Infant Feeding."

gently pat him on the back until he belches gas, for when he is in an upright position he can do this without causing regurgitation.

The First Nursing

2. The first nursing: The normal new baby may go to breast 6 or 8 hours after delivery so that he may learn to nurse and so that his sucking may stimulate the secretion of milk.

FIGURE 18. PROPER POSITION FOR BREAST NURSING WITH MOTHER IN RECUMBENT POSITION
(From Grulee's "Infant Feeding," Courtesy of W. B. Saunders Co.)

Additional Food before Breast Milk Comes

For the first few days he obtains nothing but colostrum in very small amounts. Some authorities claim that this is wholly insufficient to supply the needs of the child. Additional foods may sometimes be ordered during this period to prevent (1) too great loss of weight, and (2) dehydration

from lack of food or fluids, which will in turn cause elevation of temperature known as "inanition fever." A 5 per cent sugar solution is also ordered at times by some authorities. Warm sterile water should be given freely during the time before the milk comes. As much as 30 c.c. may be given every 4 hours during the first day, 60 c.c. the second, and 90 c.c. the third. The newborn baby does not begin to show signs of hunger for about 48 hours.

Regularity in Nursing

3. Regularity in nursing is essential: The fundamental requirement for stimulation and continuation of milk flow is the complete and regularly repeated evacuation of the breasts. (Dr. J. P. Sedgwick.) The interval between feedings should be determined at once and the baby should be awakened to be fed until he has learned regular habits, then he will usually be awake at nursing time.

Rotation of Breasts

4. Rotation of the breasts: After the milk supply is established and the baby obtains sufficient milk from one breast at a time, he is usually nursed alternately, first at one breast, then at the other. If the milk supply is scanty, he may be nursed at both breasts every time. Then if they are thoroughly emptied by manual expression after he nurses, they will be stimulated to secrete more. If the baby does nurse both breasts every time, nursing should be started at alternate breasts, because he does his most vigorous nursing during the first 5 minutes.

Length of Nursing Period

5. Length of the nursing period: A normal baby takes from ½ to ¾ of the milk obtained at a nursing during the first 5 minutes at breast. The maximum time for a nursing period should be no more than 15 or 20 minutes. He may obtain sufficient milk in less time than that. If he is nursing both breasts divide the time between them. Do not allow him to go to sleep at the breast; if he falls asleep, awaken him.

Interval between Feedings

6. Intervals between feedings: Experience at the University of Minnesota has been that the normal newborn thrives if fed at intervals of 4 hours, 5 feedings in 24 hours, i.e., 6 A.M., 10 A.M., 2 P.M., 6 P.M., and 10 P.M. The 2 A.M. feeding is ad-

vised for 2 or 3 months, especially if the baby is at all underweight. The 4-hour interval between feedings is desirable because it gives the mother more freedom and prevents much of the regurgitating of the baby by allowing his stomach more time to rest between feedings. However, many authorities advise feeding the new baby much oftener, every 2½ to 3 hours.

To Determine Amount of Breast Milk Obtained

7. Amount of milk taken at a feeding: To determine the amount of breast milk the baby takes at a nursing period, weigh him before and after nursing. To do this, prepare him for nursing, see that his diaper is dry, and weigh him with all his clothes on. Record the weight and after he has nursed weigh him again, changing no part of his clothing even if he has urinated or defecated. The difference in grams between the two weights is the amount the baby obtained. It occasionally happens that he weighs 5 to 10 grams less at the second weighing than at the first. This means that he obtained nothing at breast and that the loss of weight was due to the energy used in the sucking.

Additional Water between Feedings

G. Water should be given the normal baby even if he has sufficient breast milk. Warm sterile water is used and should be given from a nursing bottle 2 or 3 times daily between feedings. It is very essential that all babies have extra water during hot weather.

Complemental and Supplemental Feeding

H. Complemental feeding is the administration of milk from a nursing bottle following the nursing from the breast. Supplemental feeding is the substitution of a bottle for a breast feeding. (See note 3.) Since we know that the breast secretes in proportion to its stimulation, the complemental feeding is far more satisfactory, for the baby nurses most vigorously during the first of the nursing period, and that is the time he stimulates the breasts most. Complemental feeding is given only when there is not sufficient breast milk to fulfill the baby's needs after he has nursed both breasts. Weigh him before and after nursing, then estimate the amount of complemental feeding necessary. The modified milk given

should be of a strength which is suitable for the average child of the same age. (See Artificial Feeding, Chapter XI.) In beginning the use of cow's milk, however, a lower strength must be used than the child will require for growth, and then it is gradually increased to the desired strength, thus accustoming him to cow's milk. If a bottle feeding is given directly after the breast, it is always best to use a nipple from which milk comes with difficulty, or the baby will quickly learn that he can obtain food from the bottle with less effort and will refuse to take the breast because the milk comes harder. Supplemental feedings are used when it is desirable to wean the baby. The premature baby is generally too weak to nurse and the effort of sucking uses up too much of his vitality. The mother is taught to express both her breasts regularly every 4 hours, and the expressed milk is given the small baby by gavage. By this complete and regular evacuation of the breasts they are stimulated and a mother may keep her breast milk supply over an indefinite period.

Manual Expression of Breast Milk

1. We are told that the fundamental requirement for the stimulation and for the continuation of the milk flow is the complete and regularly repeated evacuation of the breasts.[7]

Purpose

Therefore manual expression of the breasts by completely emptying them will stimulate them to secrete more.

Technique

To express a mother's breast, the breast should be washed, and the nurse's hands scrubbed thoroughly.[8] With the left hand a sterile bowl or graduate is held under the breast to be expressed, the breast grasped gently but firmly between the thumb of the right hand, placed in front, and the remainder of the fingers on the under surface of the breast. The thumb in front and the first finger beneath should rest just outside of the pigmented area of the breast.

2. A downward pressing motion is made with the thumb on the front against the fingers on the back of the breast,

[7] Sedgwick, J. P., M.D., "Establishment, Maintenance, and Reinstitution of Breast Feeding."

[8] "Breast Feeding." U. S. Department of Labor, Children's Bureau.

and the thumb in front and the fingers behind are carried downward to the base of the nipple.

FIGURE 19. METHOD OF EXPRESSING BREAST MILK

3. This second act should end with a slight forward pull with gentle pressure at the back of the nipple, which causes the milk to flow out. The combination of these three down-

ward movements may be described as "back-down-out." It is not necessary to touch the nipple. This act can be repeated 30 to 60 times a minute after some practice.

The baby with an unoperated congenital cleft of lip or palate often cannot suck, and the mother can express her milk and give it to him by gavage, a spoon, a Breck feeder, etc. After operation it is given to him by gavage. Also it is occasionally necessary or convenient for the mother to be absent at a nursing period. She can express her milk and in her absence it can be fed from a nursing bottle at the regular time. This makes nursing less of a burden by allowing the mother more freedom. If a breast fed baby is admitted to a hospital and it is not possible for the mother to be on hand to nurse him, she may empty her breasts by expression every 4 hours at home, keep the milk on ice, and once every 24 hours bring it to the hospital for the baby. If possible it is desirable that he should nurse the breast at least once in 24 hours.

Wet Nursing

J. Wet nursing is the best substitute for maternal nursing, but it presents many difficulties and is often unpractical.

Qualifications of Wet Nurse

1. Qualifications of a wet nurse (see note 3):

a. She should be in good health and free from tuberculosis, syphilis, or other chronic diseases. The baby whom she is to nurse must also be free from syphilis because a syphilitic baby may infect the woman who nurses it.

b. She should have sufficient milk for her own baby and for another one. This may be determined by weighing her baby before and after nursing for 24 hours, and by expressing her breasts after nursing. She may either nurse the baby directly at her breast or express her milk and then feed it to him.

c. Preferably she should be between 18 and 25 years of age.

d. The age of her baby compared with the age of the baby she is to nurse is insignificant.

To Procure a Wet Nurse

2. To procure a wet nurse is often very difficult. Some children's hospitals, in order to always have the necessary breast milk for their sick babies, employ wet nurses, boarding

them and their babies. (This is done at the St. Louis Children's Hospital and at Sara Morris Hospital, Chicago.) Boston has a wet nurse directory where women who are willing and who are able to qualify to act as wet nurses are registered.[9] They are then sent out to any one desiring their services. Infant welfare societies and social service organizations in various localities are always very coöperative in helping to obtain wet nurses, or to procure milk from them. The usual price of breast milk is ten cents an ounce. In any instance where it is impossible to obtain a regular wet nurse, breast milk may be expressed from the breasts of several women, collected and fed the baby from a nursing bottle. It is advisable to sterilize this mixed milk by boiling for two minutes.[10]

Hygiene of Wet Nurse

3. Hygiene of the wet nurse should be governed by the same rules as those for the nursing mother.

To Give Baby Milk from Wet Nurse

4. The wet nurse usually nurses her own baby and she may or may not nurse the other baby for whom she is to supply the milk. If that baby is too weak to suck, she may sometimes express her own milk directly into his mouth. When a normal baby is nursing vigorously from one breast, milk will very often flow from the other breast at the same time. This may be allowed to drip into the other baby's mouth, or the breasts may be expressed either before or after her baby has nursed and the milk given the other baby by gavage, if necessary, or by some other method. This is usually the most satisfactory way and also the most advisable, because the expressed breast milk can be sterilized before it is fed the baby. (See note 3.)

Weaning

K. Weaning: The normal breast fed baby, even though he is thriving, has additional food starting at 6 or 7 months of age. This is to supply sufficient iron and other food elements

[9] Talbot, F. B., M.D., *Journ. Am. Med. Assn.*, 1911. Vol. lvi. p. 1715.

Talbot, F. B., M.D., *Boston Med. and Surg. Journal*, 1911. Vol. cliv, p. 290.

[10] Morse and Talbot, ''Diseases of Nutrition and Infant Feeding.''

necessary to growth. The baby fed exclusively on breast milk for a year or two often has anemia and shows signs of rickets. Weaning, according to the best authorities, is ordinarily started in the last quarter of the first year. It is done gradually and in the following manner: First one breast feeding is dropped and supplemented by artificial feeding. Then when the breasts have adjusted themselves to this, a second one is dropped, and so on until at the end of about 3 weeks all breast feedings are given up. This gradual lessening of the demand on the breasts decreases their secretion so that there is very seldom any difficulty or discomfort caused. A tight breast binder may be applied and a saline cathartic may be ordered. Weaning should be avoided during extremely hot weather if possible. If it can be arranged, it is advisable to delay complete weaning until the cooler weather. The artificial food given the infant during and after weaning should be a weaker mixture at first than that taken by the infant of the same age who has been accustomed to cow's milk. The strength can be increased gradually as the child's tolerance develops. (See Chapter XIV, Food for the Child, for list of other foods besides milk which are given at this age.)

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CHAPTER XI

ARTIFICIAL FEEDING OF INFANTS

Definition

Artificial feeding of an infant is the attempt to feed him some other food than breast milk. There is no perfect substitute for breast milk, since that is the food nature intended for him. Occasionally, however, maternal nursing is impossible and a substitute has to be found for the baby. (See Contra-indications to Nursing an Infant, Chapter X.) Since wet nursing usually proves unpractical, there have been many methods and foods employed in attempting a substitute. These attempts have been more or less successful in some but not in all cases. Therefore, there is no standard artificial food for infants.

Requirements

The requirements of an artificial food are:

1. It must furnish the same food constituents as breast milk:
   a. In such proportions as can be utilized by the infant.
   b. In sufficient quantities to maintain proper nutrition.
2. It must be clean, pure, and free from harmful bacteria.
3. It must be reasonably economical.

Breast milk contains a combination of food elements—fat, protein, carbohydrates, salts, and water—best suited to the digestive powers of an infant. The artificial food which most nearly fulfills these demands is the milk of some mammal.

Cow's Milk Most Suitable Substitute for Breast Milk

Cow's milk is the most available, although it is by no means a perfect substitute, because the food elements contained therein differ in quantity and in chemical composition from the elements of breast milk. Therefore, cow's milk has to be modified or altered to better meet the requirements of

the infant. Goat's milk is considered advantageous for artificial feeding by some authorities, but it is seldom used because it is difficult to obtain.

Comparison of Human Milk and Cow's Milk

If we compare cow's milk and human milk, we find that both contain emulsified fats, carbohydrates, proteins, and mineral salts in solution, and that the chemical composition of both varies. That of cow's milk depends upon the breed and health of the cows, character of their food, period of lactation, season of the year, length of interval between milkings, the portion of milk withdrawn, and other factors. The following table from Hess shows some of the differences between cow's milk and mother's milk:[1]

COW'S MILK		HUMAN MILK
Amphoteric or acid	Reaction	Amphoteric or alkaline
1.029 to 1.034	Specific gravity	1.010 to 1.040
3.5%	Protein	1.5% to 2.0%
3.02%	Caseinogen	0.5% to 0.75%
0.53%	Lactalbumin	1.23%
Clots in large, lumpy curds	Effect of rennin	Clots in fine curds
4.0%	Fat	3.5% to 4.0%
4.5%	Lactose	6.0% to 7.0%
0.75%	Salts	0.2%
13% to 14%	Total solids	12% to 13%
86% to 87%	Water	86% to 87%
Never sterile	Bacterial contents	Practically sterile

While cow's milk may be modified to approximate woman's milk in composition, it can never be just the same or as good for infants. **Appearance** In appearance it is much more opaque than human milk. **Protein** There is nearly three times as much protein in cow's milk as in human milk. The reason for this is obvious, since the ratio of the growth of the calf to that of the infant is about as two to one. The protein in cow's milk is chiefly casein (3.02 per cent insoluble protein) and little lactalbumin (0.53 per cent soluble protein), while human milk contains casein 0.59 per cent and lactalbumin 1.23 per cent. Attempts have been made to make the curd of cow's milk more

[1] Hess, Julius H., M.D., "Principles and Practice of Infant Feeding."

nearly resemble that of the mother's milk in its physical properties by:

1. Boiling.
2. Citration.
3. The addition of cereal water.

Sugar

Lactose is the principal sugar in both cow's and human milk, but varies greatly in amount in each, cow's milk containing less than human. The average amount of fat in the two milks is about the same, but there is a marked difference in

Fat

the emulsion and composition. The fat of cow's milk contains a greater proportion of the volatile fatty acids which, it is believed, makes it more difficult to digest. The fat globules are larger in cow's milk also. The differences cannot be corrected by any known method of modification. The

Salt

salt in the two milks varies both quantitatively and qualitatively. Calcium and magnesium are in greater proportion in cow's milk, while potassium and sodium bases are in relatively greater amounts in human milk. These differences have an important bearing upon the infant's metabolism, but thus

Ferments

far no definite conclusions have been drawn. Ferments which favorably influence the processes of metabolism and anti-

Antitoxins

toxins which render a certain amount of immunity are contained in milk which can be utilized by the infant only when fed upon human milk, for when contained in the milk of other species they do not get into the body fluids of infants. The importance of these biological differences is still a matter of dispute. Human milk is practically sterile when the baby receives it, while the cow's milk is not and often has a high bacterial count. Sterilized, pasteurized, and certified milk were the practical results of efforts to obtain germ-free milk

Production of Cow's Milk

for infant feeding. The milk for artificial feeding of infants must come from healthy cows, must be clean, and must be kept in a cool place in order to minimize the bacterial count. It must be delivered to the consumer as soon as possible in such a way as to prevent any contamination; it must be handled cleanly and in sterile receptacles in the home; and it must be

The Cow kept cool and must be covered at all times. The cow from which the milk is obtained must be healthy, free from tuberculosis and glanders (tuberculin and mallein tests advisable as routine), and must pass a general examination. The cow **Care of the Cow** must be kept clean in a clean stable which is well ventilated and drained. (No dust, manure, or fodder, except that used **Feeding of Cow** for immediate feeding, should be kept in the stable.) Dry feeding is preferable, since the feces are less liquid, and the **The Milking** cow can be kept clean more easily. The milking must be done in a clean way. The milker must be free from any communicable diseases and of clean habits. The udders of the cows and the hands of the milkers should be scrubbed with warm water and soap immediately before milking and an antiseptic may be applied afterwards. Milking should be done in covered cans through a filter. The cans should be cleaned immediately after the milk is poured out, first with cold and then with hot water, and rinsed again with hot water before milking. The first few ounces should be discarded, since this milk contains large numbers of bacteria which are **Care of the Milk before Delivery** washed out from the excretory glands. Milk obtained with the preceding precautions should be cooled at once in order to prevent the growth and multiplication of bacteria which have entered the milk despite precaution. This is accomplished by a special cooling apparatus or simply by pouring the milk into sterilized bottles and closing with a sterilized cap and putting on ice. The bottled milk should be kept iced until it reaches the consumer, which should not be later than 24 hours.

Care of Milk after Delivery In the home similar precautions should be taken to prevent contamination, i.e.: 1. Keep the container covered always. 2. Keep the milk iced until everything is ready for making the feeding. Much good milk is spoiled on the doorstep of the home between the hour of delivery and the hour of placing the milk in the ice-box. All utensils and vessels used in the preparation of the mixture must be clean and sterilized by boiling. As soon as the mixture is made it should be

covered and put in the ice-box and should be kept there, portions being taken out for individual feedings and warmed separately before each feeding.

Dangers from Poor Milk

Milk is responsible for more sickness and deaths than perhaps all other foods combined.[2] There are several reasons for this:

1. Bacteria grow well in milk, therefore a very slight infection may produce widespread, serious results.

2. Of all the foodstuffs milk is the most difficult to obtain, handle, transport, and deliver in a clean, fresh, and satisfactory condition.

3. It is the most readily decomposable of all foods.

4. Finally, milk is the only standard article of diet obtained from animal sources which is consumed in its raw state. Although from a public standpoint there are only two kinds of milk, good and bad, the following classification is considered most practical by the government: A. Certified milk. B. Inspected milk. C. Market milk.

Certified Milk

A. The term "certified milk" was coined by Dr. Henry L. Coit of Newark, New Jersey, who, in 1892, needing a good milk for his own baby, formulated a plan for the production of clean, pure, fresh milk, under the auspices of a medical milk commission. The term "certified milk," then, is a milk of the highest quality, of uniform composition, obtained by clean methods from healthy cows under special supervision of a medical milk commission. It should not contain more than 10,000 bacteria per cubic centimeter and should not be more than thirty-six hours old when delivered.

Inspected Milk

B. "Inspected milk" should be limited to clean, fresh milk from healthy cows as determined by the tuberculin test and physical examination by a qualified veterinarian. The cows are to be fed, watered, housed, and milked under good conditions, but not necessarily equal to those conditions prescribed in the production of "certified milk." Scrupulous cleanliness must be exercised and particular care must be

[2] Rosenau, Milton, "Preventive Medicine and Hygiene."

taken that persons having communicable diseases do not come into contact with the milk. This milk must be delivered in sterilized containers and must be kept at a temperature not exceeding 50° F. until it reaches the consumer. There should not be more than 100,000 bacteria per cubic centimeter in "inspected milk." This milk should be pasteurized.

Market Milk

C. All milk that is not certified or inspected in accordance with the above regulations, and which is of unknown origin, is classed as "market milk" and should be pasteurized.

Breed of Cows

The breed of cows from which milk comes makes a difference. The milk of Ayreshires and Holsteins is more suitable than that of Jerseys and Guernseys for infant feeding because of the lesser fat content, the finer division of the fat, and the lower proportion of volatile fatty acids. It is better also to use, if possible, the milk of a herd rather than that of one cow, because the mixed milk is more uniform and stable in composition and shows less variation. If milk is obtained from one cow and she has some disturbance, the composition of her milk changes and may upset the baby, while if the milk is obtained from a herd, an upset of one or two cows will not be felt by the baby because the milk is so diluted. On the other hand, it is, or should be, self-evident that the milk of a healthy cow properly fed and cared for, taken in the proper way and kept under the proper conditions, is better than the mixed milk of a herd which is improperly fed and whose milk is not carefully obtained nor carefully taken care of.[3]

Mixed Herd

Pasteurization of Milk

Pasteurization of milk consists in heating it to 150° F. and retaining it at that temperature for 15 or 20 minutes, then rapidly chilling it. (See note 2.) It is the simplest, cheapest, least objectionable, and most trustworthy method of rendering infected milk safe. Pasteurization, however, cannot atone for filth and should not be used as a redemptive process. Only certified milk, or milk of an equally high character, can be regarded as reasonably safe and satisfactory

[3] Morse and Talbot, "Diseases of Nutrition."

without pasteurization. Less than 1 per cent of all the milk found upon the market comes within the honor class. Pasteurized milk must be handled at least as carefully as raw milk. It should be kept cool and delivered promptly. Pasteurization is not a substitute for inspection; it is an adjunct to inspection. Inspection gives us a cleaner and better, but not necessarily a safer milk, while pasteurization eliminates the dangers which inspection cannot see.

Boiling of Milk

Milk is boiled for two reasons: (1) to sterilize it, and (2) to make it more easily digestible. European countries, as France and Germany, give only boiled milk to their babies. In many places in America boiled milk is used exclusively in infant feeding. (See note 1.) Dr. Julius Hess of Chicago says: "While we do not believe that feeding with boiled milk should be advised as a general measure, (1) when it is possible to obtain a good certified milk, (2) when the price is not prohibitive, (3) when it is well digested by the individual infant, and (4) when the latter is to be placed in the hands of mothers and nurses who can be depended upon to keep the milk clean and wholesome through proper icing and handling; we do believe that when these requirements cannot be met, it is safer, even for well babies, to be fed a thoroughly sterilized milk, and that this can be done without danger of scurvy and rickets when these feedings are accompanied by the administration of fruit and vegetable juices, nondextrinized cereals, and cod liver oil." Most authorities agree that boiled milk is easier to digest, especially for the delicate infant or for the one with digestive disturbances.

Reasons for Pasteurizing Milk

Disadvantages of Pasteurization

Pasteurized milk was first recommended for infant feedings because it was believed that the process of pasteurization destroyed the vitamins or antiscorbutic properties less than did boiling.[4] A recent work by Dr. Alfred Hess of New York tells us that the duration of the heating process is of greater importance than the degree of temperature to which

[4] Hess, Alfred H., M.D., "Newer Aspects of Some Nutritional Disorders." *Journ. Am. Med. Assn.*, March 12, 1921.

the food is subjected and that milk which has been heated to the temperature of 145° F. for 30 minutes has lost more of its antiscorbutic potency than has milk which has been raised to a temperature of 212° F. for a few minutes.

To Boil Milk

Milk never boils (reaches 212° F.) in a double boiler. It should be put in a saucepan and placed directly over the flame and should be boiled for the length of time ordered, being stirred constantly to prevent burning.

To Pasteurize Milk

To pasteurize milk in the home, put it in the inside of a double boiler, fill the outside with cold water to the level of the milk inside, place over the flame and bring the milk to a temperature of 155° to 167°. Hold it there for 20 to 30 minutes, remove from the fire, cool at once, put in a sterile receptacle, cover and keep on the ice. (See note 1.) There are various pasteurizers on the market; the Freeman pasteurizer is convenient, accurate, and easy to handle.[5]

Other Materials Used in Infant Feeding

Other materials used in infant feeding are:

Water

(a) Cool *sterile water* which is used as a diluent for milk in the feeding of the very small baby.

Carbohydrate

(b) *Carbohydrates,* which are added to cow's milk. The sugars used are:

Lactose

1. Lactose or milk sugar, which is the natural sugar of milk and is quite generally used in formulæ. It is most rapidly broken down in the stomach and is more slowly absorbed, staying in the intestines longer, thus favoring the growth of intestinal flora. It is slightly laxative.

Saccharose

2. Saccharose or cane sugar has the great advantage of being cheaper than other sugars. In a large proportion of cases it does quite as well as lactose or maltose. It is distinctly less laxative and ferments more readily in the stomach.

Maltose

3. Maltose is very expensive as a pure product, being practically unavailable for infant feeding. There are many maltose preparations on the market, however, which contain varying proportions of dextrin and maltose; their action in the bowels varies accordingly, depending on their maltose,

[5] Griffith, J. P. Crozer, M.D., "Diseases of Infants and Children."

dextrin, and alkaline content. The proprietary foods containing a considerable percentage of dextrin in the absence of potassium salts are constipating (Horlick's Malted Milk, Mead's Dextri-maltose No. 1 and No. 2), while those with a higher maltose content together with potassium carbonate (Borcherdt's Dry Malt Soup and Mead's Dextri-maltose No. 3) or with potassium bicarbonate (Mellin's Food) are laxative.

Starch

(c) Starch in the form of a cooked cereal solution (3 per cent to 6 per cent) is used as a diluent in cow's milk formula after the baby is 2 months old. Barley, rice, or oatmeal (in a 5 per cent solution) are the cereals most commonly used. It is believed that, besides increasing the total carbohydrate intake, the starch solution helps prevent the formation of large casein curds by mechanical action due to its colloidal nature.

Rice Barley Oatmeal

Proprietary Foods

There are many proprietary foods or so-called "Infant Foods" or "patent foods" on the market. When considering them, we must remember that there are only certain food elements, namely: fat, carbohydrate, protein, and mineral salts. (See note 3.) There can, therefore, be nothing in these proprietary foods except these elements, all of which can be put into simple cow's milk modifications in any form and in any amount desired. As a matter of fact, patent foods are composed largely of carbohydrates with relatively small amounts of fat and protein. The baby fed on such a food very often gains weight rapidly at first, but later suffers from nutritional disorders as the result of a poorly balanced diet. When such proprietary foods are (1) ordered by the physician, (2) with definite indications for their use, and (3) definite ends in view, and (4) provided they are to be used in connection with milk and (5) their composition is definitely known, their chief dangers are eliminated. But what is done is exactly the opposite in most instances. In the first place, they are often prescribed at random or following the directions on the can as offering the line of least resistance; in the second place,

Composition

parents are sometimes lured by the attractive advertisements of the manufacturers and the ease with which these foods are prepared and attempt to feed their own babies without consulting a physician, the results often proving unfortunate[6]; in the third place, breast feeding is thus discouraged when it should be encouraged, and, in the fourth place, these foods are costly, being much greater in price than ordinary milk mixtures.

Condensed Milk

Milk is condensed (1) by evaporation through a vacuum, condensed (sweetened) milk and evaporated milk, and (2) by drying, dry milk powder. The products of the first class retain a considerable quantity of their moisture and depend upon canning and sterilization for their preservation, while milks of the second class are sufficiently dry to keep for long periods of time without further sterilization. The sweetened condensed milk when diluted with water gives a poorly balanced diet because, like proprietary foods, it contains a large amount of carbohydrate and relatively small amounts of fat and protein. Recent experiments lead us to believe that the low protein content of diluted condensed milk is one of the most important factors in its failure as a food for infants. The baby fed on any of this type of milk will grow fat and will seem to thrive for a time, but because of the low fat and protein content, his growth and development will be seriously interfered with, resulting in nutritional diseases and lowered resistance. The unsweetened condensed milk or powdered milk can be diluted with water so that it contains reasonable amounts of protein and fat, and sufficient sugar can be added to fill the individual baby's needs. These mixtures are of definite value for temporary use when clean, fresh milk cannot be obtained, as in traveling, or in such countries as Labrador, where fresh milk is not available.[7]

Sweetened Condensed Milk

Unsweetened Condensed Milk

Modification of Milk

The modification of milk is the adaptation of milk to the

[6] Ramsey, W. R., M.D., "Care and Feeding of Infants and Children."
[7] Burnett, J., "Disadvantages of Dried Milk in Infant Feeding." *Practitioner*, March, 1921.

nutritive requirements of the individual infant.[8] In breast feeding there is under normal conditions a certain automatic adjustment between the amount of food needed and the amount supplied. If too much milk is taken the excess is disposed of by regurgitating or vomiting or it passes through the bowel in partly digested stools; if digestive disturbances do occur they are very slight. If insufficient is obtained by the baby he demonstrates hunger and ceases to gain weight; in this way the mother's breasts are stimulated to greater production. In artificial feeding, simply because the food given is not a normal one for the baby, it becomes even more important that the requirements of the infant shall be met as nearly as can be determined. With any substitute food both an excess and a deficiency are more potent for harm than with the natural food of the infant.

Methods of Modifying Milk

There are several methods of modifying milk:

Percentage Method

1. The *percentage method of feeding* is frequently spoken of as the American or Rotch's method, since Professor Thomas Morgan Rotch of Harvard did much to popularize and systematize the method. From the above comparisons of cow's milk and mother's milk, we see that the original attempts were to make a substitute for human milk from cow's milk with the same percentage of elements. This, of course, is impossible because of the difference in chemical composition of the various food elements of the two milks. So-called percentage feeding is not a method of feeding; it has nothing to do whatever with the choice of food elements, but is the method of determining the composition of an infant's food by calculating in terms of percentage the various elements contained in the food, as protein, fat, carbohydrate, etc. This is more accurate than estimating the baby's food in terms of the relative ounces of milk, water, etc., in the food. The approximate percentage of every food element given the infant in his formula is known and these constituents are increased or decreased to meet the definite clinical pictures, being guided

[8] Holt, L. Emmett, M.D., "Diseases of Infancy and Childhood."

by the knowledge of the mutual relationships which these elements bear to one another. Without a knowledge of the percentage composition of a formula no scientific feeding is possible. (See note 5.) (Morse and Talbot's "Diseases of Nutrition," Chapter XVII, gives a clear and brief method of calculating formula according to percentage methods.)

Caloric Method

2. The *caloric method of feeding* was advocated by the German school. (See note 1.) This provides the infant with the required number of heat units, the estimation of his need being based on his weight. Careful experiments have given us the following figures to use as averages:

Caloric Requirements

Average infants under 2 months of age..........65 to 100 calories per kilo.
Average infants over 2 months of age..........100 to 120 calories per kilo.
Premature and thin infants under 2 months of age..........................110 to 140 calories per kilo.
Thin infants over 2 months, depending on general condition.......................120 to 150 calories per kilo.

This check upon the caloric contents is inestimable in determining the value of mixtures and in avoiding over and under feeding. However, it cannot be strictly followed because (1) the individual baby has to be considered, the small under nourished baby requiring more calories per kilo than the well nourished one, (2) the activity of the individual child alters the caloric need also, and (3) it is evident that a food may contain the requisite number of calories and yet be constructed on an entirely wrong basis. Condensed milk mixture is an example of this. The caloric feeding is, therefore, like percentage feeding, not a "method of feeding." It is only a method of calculation serviceable in estimating whether or not the food answers the infant's caloric needs. It aids in no way in determining how the food shall be composed in order that these needs shall be met.

To Determine Caloric Value of Milk Mixture

A. To determine the caloric value of a milk mixture: We must know, first, the percentage composition in order to estimate the number of calories in a given milk mixture.

One gram of fat	9.3 calories
One gram of carbohydrate	4.1 calories
One gram of protein	4.1 calories

Then to determine the caloric value of 1000 c.c. of whole cow's milk: We must know that the percentage composition of cow's milk is approximately:

Fat	4%
Carbohydrate	4.5%
Protein	3.2%
Salts	0.75%
Water	86 to 87%

(The salts and water are ruled out as having no food value.)
Method:

Multiply 1000 by each of the above figures:

Fat	$1000 \times 0.04 = 40$ grams in 1000 c.c.
Carbohydrates	$1000 \times 0.045 = 45$ grams in 1000 c.c.
Protein	$1000 \times 0.32 = 32$ grams in 1000 c.c.

Number of calories:

Fat	$40 \times 9.3 = 372$ calories
Carbohydrate	$45 \times 4.1 = 184.5$ calories
Protein	$32 \times 4.1 = 131.2$ calories

687.7 or approximately 700 calories in 1000 c.c. of whole milk.

To Determine Caloric Value of Breast Milk

B. To determine the caloric value of breast milk:

Percentage composition is:

Fat	4%
Carbohydrate	7%
Protein	1.6%
Salts	0.2%
Water	86 to 88%

Method:

Fat	$1000 \times 0.04 = 40$ grams in 1000 c.c.
Carbohydrate	$1000 \times 0.07 = 70$ grams in 1000 c.c.
Protein	$1000 \times 0.016 = 16$ grams in 1000 c.c.

Number of calories:

Fat	..................40 × 9.3 = 372	calories
Carbohydrate	..........70 × 4.1 = 287	calories
Protein	...............16 × 4.1 = 65.6	calories
	724.6	Total calories in

1000 c.c. of breast milk.

From the above example we see that 1000 c.c. of breast milk has 724.6 calories and that 1000 c.c. of cow's milk has 687.7 calories. For practical purposes we may consider that they both have 700 calories in 1000 c.c.

Whole Milk Dilutions with Added Carbohydrate

3. *Milk dilutions with the addition of carbohydrates.* Whole milk diluted with water and with the addition of sugar in any amount the individual baby requires is a satisfactory modification for the majority of babies. But the percentage of fat, carbohydrate, and protein in such mixtures has to be estimated in order to feed the infant scientifically. Also the caloric value of the food must be known.

Application of Whole Milk Dilutions with Added Sugar

Practical application of whole milk dilutions with added sugar:[9]

Protein

For even the youngest or most delicate infant it is unnecessary to dilute the whole milk to more than ⅓ strength even during the first week or two of life. After this time the concentration of the milk is gradually increased until during the second month the baby takes ½ milk and ½ water; by 5 months, ⅔ milk and ⅓ water; and by 9 or 10 months, undiluted whole milk. It will be seen that in feeding such dilutions of milk the proportion of protein is greater than in human milk except during the early weeks; this is not a disadvantage in normal cases since protein is well tolerated by infants.[10] (See note 8.) Recent work has proven that when cow's milk is substituted for mother's milk the protein intake should be considerably increased, doubled or even trebled. Infants from 1 to 9 months of age can receive from

[9] Marriot, Wm. McKim, M.D., Unpublished Notes for Nurses.

[10] Bosworth, Alfred W., "Studies in Infant Feeding." *Am. J. Dis. Child.*, Aug., 1921.

15 to 30 grams of protein daily when fed on the usual modification of cow's milk. This increase in protein requirement when cow's milk is substituted for mother's milk is probably due to differences between the two milks in amino-acid content. Measures are often taken to help in breaking up the curd to aid digestion, as boiling the milk, citration and the addition of cereal waters. The proportion of fat in the diluted whole milk mixture is considerably less than that of the human milk, but this is advantageous because it has been positively established that fat plays an important part in nutritional disorders of the artificially fed baby. (See Fat, under Composition of cow's milk.) The deficiency of fat can usually be successfully compensated by the addition of sugar and starch to the formula. It is stated by some authorities that the optimum amount of whole milk for an average infant during the first year is about 1/10 of his body weight in grams, or 1½ ounces to a pound, and the amount of added sugar is approximately 1/100 of his weight in grams. (Dr. Pfaundler's method.) This is another method of checking up on the feeding of children.

Fat

Dr. Pfaundler's Rule for Feeding

Diluent of Milk

The *diluent* used during the first month or 6 weeks of life is *sterile water.* After this a 5 per cent cereal water is prepared. Rice, barley, or oatmeal are favorite cereals to use. (See directions for making cereal water, Chapter XIII.)

Carbohydrate

Carbohydrate, generally in the form of sugar, is added to all milk dilutions to bring the percentage up to 7 or 7½. This is the amount of sugar in human milk, and is the optimum for the average infant. Those fed on less sugar than this are not likely to gain satisfactorily and consistently and those fed on more are very prone to gastro-intestinal disturbances. (See previous discussion of sugars in relation to infant feeding.)

To Break Up Curd

To break up the curd and to assist the digestion of cow's milk (see note 1):

Many infants can digest raw cow's milk but when not well

taken the tendency to the formation of large protein curds in the stools is relieved by boiling the milk 2 or 3 minutes. The addition of sodium citrate to the milk mixture prevents the formation of hard curds. The proportion of sodium citrate used is approximately one grain for every ounce of milk mixture. When an alkali, as lime water, is added to the milk mixture in sufficient amounts so that the mixture remains neutral or alkaline in the stomach, even after the stomach has secreted acid, large protein curds do not form because casein is not coagulated by rennin when the solution is alkaline. Lime water is commonly used in amounts equaling 5 per cent of the milk mixture.

Number of Feedings

Number of feedings in 24 hours:

The normal newborn baby who is breast fed thrives on a 4-hour schedule. The artificially fed baby can also be fed at 4-hour intervals to advantage. Many babies will need only 5 feedings in the 24 hours from the start, 6 A.M., 10 A.M., 2 P.M., 6 P.M. and 10 P.M. If a baby is under weight and sufficient milk for his needs cannot be given him in 5 feedings he is given 6 feedings: 6 A.M., 10 A.M., 2 P.M., 6 P.M., 10 P.M. and 2 A.M.

Amount of Milk at Every Feeding

Amount of milk at every feeding:

The amount of milk given at every feeding period depends somewhat upon the number of feedings given and upon the weight of the baby. Hess gives the following rule: from birth to the fifth month the average healthy infant will be satisfied with an amount of food approximately 2 ounces (60 c.c.) more per feeding than he is months old (1 month—3 ounces; 2 months—4 ounces, etc.). Occasionally, infants cannot take this amount and if vomiting results the quantity may be reduced. Often, however, more than this amount can be taken. The average, healthy newborn baby who is breast fed takes much larger amounts of milk than was formerly supposed possible. This has been demonstrated by weighing large numbers of newborns before and after nursing. By the end of the second week of life a robust baby is often taking

from 400 to 550 c.c. in 24 hours. After the fourth month the average infant will take one quart of milk daily. When more than a quart is needed to properly nourish him, he has reached the stage when a mixed diet should be substituted. By 6 months, 4 meals of 8 ounces each of milk mixture may be given and the fifth meal should be of vegetable soup, cereal or vegetable. (See food other than milk to be given during the first year, Chapter XIV.) The average infant will take very little food during the first 12 hours of life. He is usually given nothing but sterile water. After that time, if artificial feeding is necessary, 15 to 30 c.c. of a ⅓ milk mixture with 3 per cent sugar can be given him every 4 hours.

Table to Use as Guide in Infant Feeding

Table

Age	No. of feedings	c.c. per feeding	Dilution of milk	Diluent	Per cent added sugar	24 hour intake	Foods other than milk
2 da.	5	15	⅓	Water	3%	75 c.c.	
4 "	5	30	⅓	"	"	150 "	
1 wk.	5	60	⅓	"	"	300 "	
2 "	5	90	⅓	"	"	450 "	Orange juice
1 mo.	5	120	⅓–½	"	"	600 "	" "
2 "	5	150	½	5% cereal	"	750 "	" "
4 "	5	180	⅔	Water	"	900 "	" "
6 "	4	240	¾	"	"	960 "	" "
8 "	4	240	¾	"	"	960 "	" "
10 "	4	240	Whole milk	None	None	960 "	" "

Disadvantages of Above Table

This table (see note 9) is not to be too rigidly followed for it is merely a guide to the approximate feeding on which one might expect an average, normal infant to thrive. Since every baby is "a law unto himself," conditions may arise at any time which would be an indication for deviation from this course. The object should not be to fit the infant to the scheme, but to fit the feeding to the individual infant. This table is comparable to one which would give the average size of shoes or clothing worn by children of different ages; it does not guarantee a fit for any individual child, but indicates the general range of choice. One of the greatest mistakes made in feeding

infants artificially is that the individual child is not considered, but he is fed according to some scale or table like the above, regardless of his individual needs or tolerance. This is especially true of babies fed on proprietary foods when the "directions on the can" are being followed. When beginning to feed an infant on cow's milk for the first time, one should consider the individual baby, taking into account:

Consider Individual Baby

a. His age.
b. Normal weight for his age.
c. His present weight.
d. Number of calories per kilo for the normal baby of his age.
e. Previous feeding history.

Guides When Starting Artificial Feeding

He is started out on a much weaker formula than his age and weight would indicate, additional sugar often being omitted at first, because the baby's tolerance is unknown and until it is established great precaution must be used. The formula is strengthened gradually, increasing the strength and quantity to meet the baby's demands, being guided by his tolerance as manifested by gain or loss in weight, vomiting, diarrhea and general appearance of the baby. As long as he gains in weight no increase is necessary, but a stationary weight line or a continued loss of weight indicates the necessity for an increase. Vomiting is one of the first symptoms of overfeeding; diarrhea is always a danger signal. Only one change in the baby's food should be made at a time, i.e., an increase in quantity should not be made at the same time as an increase in strength; all changes should be gradual. Usually a ½ ounce increase is advisable since abrupt changes may disturb digestion.

Make Only One Change in Feeding at a Time

Application of the above rules:

Application of Above Rules

Suppose that we wish to feed a healthy baby of 4 months who weighs 5400 grams. According to the above table he needs 5 feedings a day, 180 c.c. at a feeding, and is allowed a mixture consisting of ⅔ whole milk, ⅓ 5 per cent cereal water and 3 per cent added sugar, and from 100 to 120 calories per kilo.

Method:

24 hour amount of feeding is 900 c.c.
⅔ whole milk is 600 c.c.
⅓ 5% cereal water is 300 c.c.
3% sugar is 27 grams.

To check up on the caloric intake of this mixture:

1000 c.c. whole milk = 700 calories.
Then 1 c.c. = .7 calories.
600 c.c. = 420 calories.
And 1 gram of carbohydrate = 4.1 calories
Then 27 grams of sugar = 110.7 calories
And 300 c.c. 5% oatmeal = 15 grams oatmeal
$15 \times 4.1 = 61.5$ calories
Therefore the total $420 + 110.7 + 61.5 = 592.2$ calories

Since the baby weighs 5400 grams, he is being fed approximately 110 calories per kilo, which is about the average amount according to the table.

Another rule for feeding allows the baby whole milk equal to 1/10 of his weight in grams or 1½ ounces for every pound of weight and carbohydrate equal to 1/100 of his weight in grams. By checking up with this method it is found that he will be allowed 540 c.c. of milk and 54 grams of carbohydrate, which agrees approximately with the above formula.

CHAPTER XII

ARTIFICIAL FEEDING OF INFANTS (*Continued*)

Technique for Making Feedings.

Milk Laboratory

In the well equipped children's department or hospital there is a special kitchen or milk laboratory where only milk is kept and only milk formulæ are prepared. This room should be used for nothing else. The nurse or nurses who are preparing formulæ should be the only persons who use the room and should be responsible for it. The room should contain:

Equipment

1. A large sink with hot and cold running water and sink shelves.
2. A gas stove with several burners.
3. An ice-box in which only milk and milk formulæ are kept.
4. A broad shelf or large table on which feedings are prepared.
5. A cupboard and drawers for utensils, supplies, etc.
6. A milk sterilizer if large numbers of feedings are to be made and if large quantities of milk have to be sterilized.
7. A bottle sterilizer where all nursing bottles are sterilized. (This may be either in the milk laboratory or conveniently located in an adjoining room.)
8. Utensil sterilizer, if possible.

Rules for Nurse

To save the nurse's time a trustworthy maid should be on regular duty to do the cleaning, wash nursing bottles, dishes, etc., under the nurse's supervision. The nurse who has charge of the milk laboratory and who makes the formulæ should wear a rubber apron to protect her uniform and she may wear a cotton apron over that. Some institutions require her to wear a large gown to cover her entire uniform in place of the small apron over the rubber one; also a large cap to completely cover her hair. (While this technique

seems very nice it is not necessary.) She should keep her hands clean at all times when handling milk and she should scrub them well before the preparation of formulæ. Rules of some hospitals demand that the nurse who makes formulæ should be considered always "clean"; that is, she is not allowed to change babies' diapers, care for isolated patients, assist at pus dressings, etc. If there are enough formulæ to be prepared to take one nurse's entire time, the above technique can be easily worked out. It can often be arranged so that she can spend her extra time in heating the feedings to be given to the babies, holding the bottles, etc. This is good technique but when one considers that the surgeon operates on a pus case, then maybe on a clean one, or he visits his other patients, does dressings, etc., and we see no bad results, it seems only logical that the nurse who makes formulæ can, by carrying out proper precautions, safely perform other duties as occasion arises. If the nurse has an upper respiratory infection she should wear a mask over her mouth and nose.

Supplies *Standard Supplies Necessary in a Milk Laboratory:*

1. Sugars:
   - Cane sugar or saccharose.
   - Milk sugar or lactose.
   - Dextri-maltose, numbers 1, 2, and 3.
   - Karo syrup—blue label brand—brown syrup.
2. Flours, cereals:
   - Rice.
   - Pearl barley.
   - Rolled oats or oatmeal.
   - Barley flour.
   - Wheat flour.
   - Farina or cream of wheat.
3. Patent foods:
   - Malt soup extract.
   - Dry malt soap powder.
   - Hoos' albumin milk powder.
   - Powdered milk.
   - Unsweetened evaporated milk.

4. Milk:
   Whole milk.
   Skim milk.
   Buttermilk or skimmed lactic acid milk.
   Whole lactic acid milk.
5. Sterile water.
6. Liquid rennet or essence of pepsin:
   Lime water.
   Sodium citrate.
   Culture of lactic acid bacilli.

1. The above sugars are commonly used in infant feedings. **Sugars** The dry sugars, cane sugar, lactose, and dextri-maltose are kept in covered glass or enamel jars plainly marked. These sugars, especially milk sugar and dextri-maltose, do not dissolve readily in cold liquids; if the formula is to be boiled the sugar will dissolve as the mixture begins to heat. If it is not to be boiled it is advisable to dissolve the sugar in warm water equal to the amount of water to be added to the formula. If no water is ordered, dissolve the sugar in the smallest possible amount of hot water (30 to 60 c.c.). It should be cooled before it is mixed with the milk. It is often more convenient to mix the sugar solution for every formula, as far as is possible, the day before; pour it into a sterile bottle, cover with a sterile square, and keep on ice until ready for use the next day.

Karo syrup (blue label brand or brown syrup) is the only kind advised for infant feedings. It is thick and hard to measure accurately, therefore it is best to make it into a 50 per cent solution by adding 55 volumes of water to 45 volumes of Karo. Since it is impossible to remove it from the can without contaminating it when pouring it over the rim of the can, it is sterilized after being mixed with the water, bottled, covered, and cooled before mixing it with the milk. It also can be conveniently made up the day before.

2. Rice, rolled oats, and pearl barley or barley flour are **Starches** the cereals most commonly used for making cereal water. These should always be on hand, kept in covered cans plainly

marked. Wheat flour may be used in the preparation of malt soup, Czerny's butter-flour mixture, etc. Farina, cream of wheat, and other finely milled cereals are used in the preparation of thick cereal feedings; they are also kept in covered enamel cans.

Proprietary Foods

3. Malt soup extract or dry malt soup powder may be needed. Hoos' albumin milk powder or some other dried or canned preparation of protein milk is convenient for an emergency because it takes so long to make protein milk in the regular way. Powdered milk and condensed unsweetened milk may also be convenient in an emergency. Other patent foods may be necessary from time to time.

Certified Milk

4. Certified milk is used if it is possible to obtain it. Whole milk is ordered daily in sufficient quantities to cover all possible needs. As soon as the milk is delivered, wash the outside of the bottles, dry them, and place them in the refrigerator. Milk should always be kept covered and removed from the ice only when it is necessary to prepare feedings. As soon as they are made they are put on ice. (See Care of Milk, Chapter XI.)

Skim Milk

Skim milk is ordered from the dairy as needed or it may be prepared by skimming the cream from a bottle of whole milk with a modified Chapin dipper. This is a small round dipper which fits into a milk bottle. To skim milk, let the bottle of milk stand until the cream has risen to the top and there is a definite cream line, then introduce the dipper carefully into the bottle so that the top of the dipper is on a level with the contents; the dipper fills with cream, is removed, emptied, and again introduced; this is repeated until all the cream is removed and only skim milk is left. The modified

Chapin Dipper

Chapin dipper has a removable bottom which allows the instrument to be pushed down into the full bottle without danger of causing it to overflow. There is on the market a milk syphon which removes the lower part of a bottle of milk, the fat free milk, leaving the top milk or cream in the bottle.

When opening a bottle of certified milk, remove the outer

cap, wipe the neck of the bottle, and remove inner cap by running the special bottle opener around the edge.

Buttermilk

Buttermilk or skimmed lactic acid milk should always be on hand; this keeps several days if not used. Whole lactic acid milk may be used for feedings.

Water

5. Water used for feedings is sterile. A special apparatus to sterilize it is most convenient in the milk laboratory and economical if large numbers of feedings are to be made. Otherwise it is boiled and cooled before being mixed with the milk. Large quantities can be boiled at once, poured into sterile bottles (5 pint for convenience), covered, and kept on ice. In this way cool sterile water is always on hand for the preparation of formulæ and for the babies when it is necessary.

Other Supplies

6. Liquid rennet or essence of pepsin is used to coagulate milk when making protein milk. Lime water and sodium citrate may be ordered in a formula to help break up the casein curd of cow's milk. Lactic acid bacilli culture is used in preparing buttermilk or skimmed lactic acid milk and whole lactic acid milk. All these above articles should be kept in the refrigerator.

Utensils

Utensils needed.

- Nursing bottles (see description).
- Nipples (see description).
- Bottle brushes.
- Covered glass or enamel jar for sterile nipples.
- Jar or container for unsterile nipples.
- Racks for bottles.
- Dairy thermometer in bottle of 70 per cent medicated alcohol. (Before using the dairy thermometer to test the temperature of the milk, rinse with sterile water. After use rinse clean with sterile water and replace in alcohol.)
- Gram scales—weights.
- Milk bottle opener.
- Can opener.
- Handling forceps—several pair—in bottle of 70 per cent medicated alcohol.

Can of sterile absorbent cotton (if used to plug nursing bottles) or can of sterile patent tops or rubber caps. (See how to plug nursing bottles.)
Can of sterile gauze—24 inches square—3 or 4 thicknesses for straining protein milk.
Can of sterile squares—4 inches square—from old cotton cloth —to cover milk bottles.
Elastic bands in box.
Tags or labels to mark nursing bottles (see how to mark bottles).
Dish towels and dish cloth.
Graduates—sizes, 1000 c.c., 500 c.c., 30 c.c.
(Glass breaks easily if boiled and enamel ones are unsatisfactory because marks wear off after repeated boiling. Porcelain laboratory graduates do not break as easily as glass and marks do not wear off with boiling.)
Egg beater.
Wooden spoons.
Modified Chapin dipper.
Funnels—enamel or aluminum—various sizes with end small enough to fit in neck of nursing bottle.
Strainers, finest wire.
Double boilers—enamel or aluminum—various sizes (1 quart to 3 or 4 quarts).
Aluminum saucepans—various sizes (1 quart to 3 or 4 quarts).
Enamel or aluminum pitchers—various sizes (1 quart to 3 or 4 quarts).
Spoons—tablespoons, dessert spoons, teaspoons.

The above list includes utensils needed for the preparation of all ordinary milk mixtures. Any special mixtures may demand more elaborate equipment.

Sterilization of Utensils

Concerning Sterilization of Utensils.

Utensils may be sterilized by boiling 10 minutes in the utensil sterilizer. If only a few feedings are to be made and if no sterilizer is convenient, the utensils may be boiled over the gas in a large pan for 10 minutes. Utensils do not need to be sterile when mixing unsterile feedings, that is:

1. When making ordinary whole milk dilutions, if all feedings are boiled routinely after being mixed.

2. When making cereal water, sugar solutions, Karo solutions, or such solutions as are boiled routinely after being made.

Utensils do need to be sterile when making sterile feedings, that is:

1. When making whole milk dilutions, if feedings are not boiled after being mixed.

2. When making lactic acid milk mixtures since lactic acid milk is a sterile product when completed and cannot be boiled.

3. When making mixtures from milk powder, evaporated milk, etc., the product is considered sterilized in the process of manufacturing and preserving and is handled with sterile utensils and is mixed with sterile water.

Nursing Bottles.

Nursing Bottles

The ideal nursing bottle is constructed so that every portion can be easily cleaned with a proper brush.[1] This necessitates the avoidance of depressions or angles. The narrow cylindrical shaped bottle is most convenient. The Hygeia large neck bottle can be used, but it is more expensive and the nipples to fit it are usually of hard rubber. The bottle should be of a good grade of glass, not easily broken, and capable of being boiled without cracking. It should hold 8 to 10 ounces and should have a series of markings pressed into the glass to indicate the number of ounces or cubic centimeters the bottle holds. There should be enough bottles so that every baby has as many as he has feedings in 24 hours. (Allow 10 bottles per baby in equipping the ward.) Then when his 24-hour amount of formula is made, it is divided into as many bottles as he has feedings in the 24 hours, marked, and kept on ice. When he is to be fed one bottle is removed, heated, and the formula fed to him. There should be wire racks to hold 4, 5, and 6 nursing bottles so that every

Kind of Bottle

[1] Hess, Julius H., M.D., "Principles and Practice of Infant Feeding."

baby's feedings can be kept in a separate rack marked with his own name. Every bottle of feeding should also be marked. There are several ways of doing this:

To Mark Bottles

1. The name may be written on a Dennison gummed label and one stuck on every bottle. If the feedings are sterilized in the bottles this method cannot be used.

2. An area 1 or 2 inches square may be glazed or frosted on every bottle and the name written with pencil in this area. It will not come off when the bottle is boiled. When the bottle is washed, rub the name off with sand soap.

3. Every baby may be given a number and a metal tag bearing his number may be attached to every one of his bottles; this may be tied around the neck of the bottle with a string, an elastic band, or the tag may have a small chain fastened to it and this may be slipped over the neck.

Covers for Bottles

As soon as the feedings are made and put in the bottles they should be covered or plugged. (1) Sterile absorbent cotton plugs may be used. (2) Rubber stoppers which can be sterilized are convenient. (3) There are patent caps on the market.

Care of Bottle

After use the bottle should be rinsed with cold water, washed with soap and water, rinsed, and sterilized before being used again. New bottles should be annealed by placing them in a container with cold water, bringing the water to a boil, boiling for 20 minutes, and then leaving them in this water until it becomes cool (see note 1); bottles thus treated do not crack so easily when hot fluids are poured into them.

Nipples

Nipples.

Kind of Nipples

Nipples should be of soft rubber, of conical or slightly bulbous shape, and constructed so that they may be turned inside out and easily cleaned. The holes in the nipple should be of such size that the milk will drop readily, but will not flow out when the bottle is inverted. The new nipple has no

To Make Holes in Nipple

holes or very small ones. A No. 3 to 5 sewing needle heated red hot over a flame makes holes the proper size for ordinary use. The blunt end of the needle is inserted into a

cork; it can then be heated and handled with ease. Three holes in a nipple are usually enough. The exact size of the holes and the number depend on (1) the consistency of the formula (larger holes are required for malt soup, protein milk, and other thick mixtures), and (2) the ability of the baby to suck. A vigorous baby does not need as large holes in his nipple as a weak or lazy baby.

Care of Nipples

After use rinse the nipple inside and outside with cold water, wash with soap and water, rinse, and boil for 2 minutes. All the nipples in use for all the babies in the department can be kept in a sterile covered can; keeping them dry lengthens the life of the rubber (See note 1). When a nipple is needed, it can be removed from the jar with sterile handling forceps and fitted on the neck of the bottle. After all the babies are fed, all the nipples are boiled together 2 minutes and replaced in the sterile jar.

A mild white soap such as Ivory should be used to wash nursing bottles, nipples, feeding utensils, etc. The dish cloth and the dish towels should be used for nothing else, and should be washed daily and dried outside if possible.

Nursing Bottle Cover

When a baby is nursing a bottle, it should have a cover on it to keep the contents warm. An outing flannel bag may be made to fit it, with a draw string around the top to adjust it. A bottle "cozy" may also be knitted for this purpose.

To Make Sterile Formulæ.

To Make Sterile Formulæ

The general arrangement of the table is as follows:

Equipment

1. Sterile towel on which are placed sterile utensils needed.
2. Supplies as needed, as sugars, etc.
3. Scales with weights.
4. Pitchers in which to mix formulæ.
5. Sterile nursing bottles in racks.
6. Paper bag for waste.

Have all necessary supplies within easy reach on the back of the table on which the formulæ are to be mixed; this in-

cludes sugars, sterile water, handling forceps, jars of sterile cotton, sterile squares, etc., as given in the list of supplies above. On the upper right hand side of the table spread a sterile towel on which are placed sterile utensils, as spoons, strainers, funnels, etc. These cannot be kept surgically sterile while the formulæ are being made, but they are kept as clean as possible. Pitchers, graduates, etc., are placed on the table after being boiled, as only the inside needs to be kept sterile. Have the necessary number of nursing bottles ready in the racks marked with the names of the children. A paper bag for waste is needed.

Procedure To measure the sugar, flour, etc., on gram scales, place on one side of the scales a sterile square of cloth (one of tops for milk bottle, 4 inches square is just the right size), balance the scales, place the desired weights on the other side of the scales, and weigh the ingredient desired by placing on the sterile square enough of it to balance the weights. After the sugar is weighed it is put into the pitcher in which the formula is to be mixed. (Karo syrup, being a solution, is measured in the graduate.) Measure and add the other constituents of the formula as ordered, milk, water, etc. Mix together by stirring with a wooden spoon. Bottle the formula by pouring into separate nursing bottles (as many as the baby has feedings in 24 hours), the amounts to be given at every feeding. As the markings on the ordinary nursing bottles graduated in ounces are not always accurate, it is more satisfactory to measure the feedings in a graduate before pouring them into the bottles. Plug the bottles with sterile cotton (or whatever method is used) and put on ice until they are given to the baby. Utensils, dishes, spoons, etc., used to make ordinary milk mixtures do not need to be washed between feedings. They may be rinsed with sterile water if desired, but by using judgment, and making simple mixtures first, leaving until the last any formula, as lactic acid milk, which will leave a taste on the dishes, the same utensils may be used for making all the formulæ.

To Make Unsterile Formulæ.

Arrange the table as above excepting the sterile articles and the sterile towel, for it is assumed that unsterile ingredients which will later be sterilized are being dealt with. To sterilize the formula after it is mixed: **To Make Unsterile Formulæ**

1. It may be boiled in a saucepan directly over the stove for 2 minutes or as long as ordered. Measure and if any has boiled away make up the original amount with sterile water; after cooling, bottle in sterile bottles and put on ice. **To Sterilize Formulæ**

2. It may be poured into unsterile bottles and sterilized in them by placing them in the milk sterilizer for the necessary length of time.

Rules for Feeding the Baby:

To heat the milk to feed the baby, remove from the ice-box one of his nursing bottles containing the correct amount of milk for the feeding; place it in water 105° F. for 5 minutes to heat it. There is a special heater on the market; it consists of a large round container with a rack inside to support the bottles and a thermometer to take the temperature of the water. After the feeding is heated, remove the cap or plug from the bottle, put the nipple on it, test the temperature of the contents by letting a few drops run from the nipple on to the back of the hand, put a cover on the bottle, and take it to the baby. The nipple should not touch anything, but should be uncontaminated until it is put in the baby's mouth. Change his diapers and make him comfortable before feeding him; put a bib under his chin whenever he is fed. He should lie on his bed, turned slightly to the right side, since it has been found that the stomach empties itself sooner in that position. The upper part of his body should be slightly elevated by means of a small pillow (See note 1). The nurse or attendant should hold the bottle until the baby empties it; he should never be left alone with it propped. When holding the bottle keep it tilted so that its contents are well up over the neck to prevent the child from sucking in air. Re- **To Feed the Baby** **To Heat Formula** **Position of Baby When Nursing**

moving the nipple frequently during the nursing will allow the air to escape.

Time to Be Spent at Nursing Period

It should take the child not less than 10 and not more than 20 minutes to take his feeding. If it takes longer than 20 minutes there is something wrong with the baby or the nipple, and an investigation should be made. Any milk left over after that time is thrown away; never save it or reheat it for a later feeding. Do not force a feeding to the point of regurgitation. If a baby takes it too fast, again investigate the nipple and make the holes to suit his needs; also remove the nipple from his mouth several times during the feeding period and force him to rest. If he is apt to belch gas and regurgitate after a feeding, the nurse should hold him upright 2 or 3 times during the feeding, and by patting him gently on the back help him to belch gas. In this upright position he can do so without causing regurgitation.

The nurse may hold the baby in her arms while feeding him if she desires. Some authorities advocate it since it is the natural position when nursing from the breast. However, it is not always practical in an institution.

To Estimate Amount Regurgitated

If a baby is regurgitating or vomiting and an estimation of the amount is desired, weigh the bib before putting it under his chin; leave it there until after his feeding and if he regurgitates on it, weigh it again. The difference in weights will give a rough estimate of the amount of the feeding lost. (Of course projectile vomiting cannot be thus estimated.)

Regurgitation

Regurgitation is the casting up without much effort of the stomach contents soon after it has been taken; it occurs in the healthy infant who has taken more food than he can comfortably hold, or who has been carelessly handled after feeding.

Vomiting

Vomiting or emesis is the ejection of partly digested contents of the stomach through the mouth; it is accompanied by effort and by evidences of nausea. Projectile vomiting is the very forcible ejection of stomach contents, often being

forced several feet from the child. It is commonly seen in pyloric stenosis or spasm of pylorus.[2]

If a Baby Refuses to Take His Feeding.

If a Baby Refuses His Feeding

A healthy baby may refuse a bottle because he has been accustomed to a sweeter mixture and does not like the present one. Occasionally saccharin is ordered in his feeding to make him take it; this is done only with a doctor's order. (See proportions under forcing water by mouth—Hydrotherapy, Chapter XVII.) A sick baby may refuse his feeding because he is too weak or too sick to suck a bottle.

Gavage

1. He may be gavaged; the catheter can be introduced through the nose or mouth. (See directions for gavage, Chapter XIX.) This is the most satisfactory method of feeding babies who cannot nurse.

Breck Feeder

2. A Breck feeder is sometimes used; this is a graduated tube open at both ends, with a small nipple at one end for the baby to suck, and a rubber bulb at the other end to assist him in sucking. Its disadvantages outweigh any supposed advantages and its use is unsatisfactory because (a) of the tendency to too rapid feeding, and because (b) it is difficult to keep clean.

Medicine Dropper

3. A medicine dropper may be used to introduce milk into the back part of a baby's mouth. A piece of rubber tubing two inches long should always be put on the tip so that the glass will not come in contact with his mouth and injure the delicate mucous membrane. The use of the medicine dropper is also more or less unsatisfactory.

Spoon

4. Occasionally milk may be given with a spoon, but it is a slow method. When water is ordered, it is best to give it halfway between feedings. Sterile water cooled to 100° F. is used; it may be given in a nursing bottle, with a spoon, or when the child is old enough he may drink it from a cup; this is a good way to teach him to drink from a cup. (See forcing fluids by mouth—Hydrotherapy, Chapter XVII.)

[2] Griffith, J. P. Crozer, M.D., "Diseases of Infants and Children."

Water should be offered to all babies several times a day, especially in hot weather. A sick baby who has fever should usually have as large amounts of water as he will take between feedings.

Home Modification of Milk.

Home Modification of Milk

If a nurse has to prepare a formula in a home, she can generally find the necessary utensils in the ordinary kitchen equipment. She should select those she needs and see to it that they are used for nothing else. They should be boiled every day before they are used, and the same technique carried out as far as possible as given above for the preparation of formulæ in the hospital. If the equipment does not allow dividing the feeding into bottles (according to previous directions), the entire 24-hour amount can be put in a sterile milk bottle, covered with a sterile square, and placed on ice. The necessary amount can be poured out at every feeding time into a nursing bottle and heated. (Never heat the whole bottle of milk before pouring out the desired feeding.)

Instructions for Mother

When a baby is discharged from a hospital, the nurse who is making formulæ should write out full directions about his feeding for his mother, and she should explain the various steps to her in detail. Some institutions have printed slips of recipes of common mixtures, as cereal water, etc., for the mothers. Also they have printed forms with general directions and blank spaces in which to insert the necessary amounts of the various ingredients, etc., for the infant's formula. The mother should be taught to measure the milk, water, etc., in ounces, for the average mother does not understand the metric system. She should be told to buy an ounce graduate (a medicine glass with markings will do) to measure the sugar, since she would not be expected to have scales, and tablespoons vary so in size that one can never be sure just how much sugar the child is having if it is thus measured. Instruct the mother to fill the glass with sugar and shake it down to the desired mark on the glass (not to press it).

Milk Laboratories.

There are milk laboratories in some of our larger cities. Walker-Gordon laboratories are the best known. The physician writes on a printed form the ingredients and the desired amounts for the formula, also special directions regarding boiling, etc. He sends this prescription to the laboratory where it is prepared under the direction of an expert, and delivered to the home. This is a very convenient and satisfactory method, but the expense must necessarily be considerably greater than for preparing the formulæ at home· this makes it prohibitive to many people.[3]

Milk Laboratories

[3] Morse and Talbot, "Diseases of Nutrition."

CHAPTER XIII

ARTIFICIAL FEEDING OF INFANTS (*Continued*)

Recipes

Whey.

Whey Preparation Put a pint of skimmed milk into a clean sterile saucepan and heat it until it is lukewarm—not over 100° F. Remove it from the stove. Add 2 teaspoonfuls of essence of pepsin or liquid rennet, or 2 junket tablets. Stir just enough to mix. Cover the pan and let it stand until the milk is firm, like jelly. Then break it with a fork until it is finely divided, strain through a cotton cloth or several thicknesses of sterile gauze. What goes through is whey.[1] To arrest the action of **Compositio** the rennin, heat the whey to 150° F. The composition [2] of whey is:

Protein	0.86	(Koenig)
Fat	0.32	
Sugar	4.79	
Salts	0.65	
Water	93.38	
	100.00	

Cereal Water.

Cereal Water To make 5 per cent cereal water, use (1) rolled oats, (2) rice, (3) pearl barley, (4) barley flour. Add 15 grams, ½ ounce, or 2 rounded tablespoons of dry uncooked oatmeal (or pearl barley or rice) to 600 c.c. or 20 ounces of water, and **Oatmeal Pearl Barley or Rice** salt to taste, about 1 teaspoon to a quart. Boil down one-half (or until there are 300 c.c. left). Place the saucepan directly over a low flame (do not use a double boiler). It will take from 1 hour to 1½ hours for this to boil down. Strain, bottle,

[1] Morse and Talbot, "Diseases of Nutrition."

[2] Holt, L. Emmett, M.D., "Diseases of Infancy and Childhood."

and keep on ice. It should be cold before being mixed with milk. To make 5 per cent cereal water using barley flour, use 25 grams of barley flour to 500 c.c. of water and ½ teaspoon salt. Make the barley flour into a smooth paste by mixing it with a small amount of water (use part of the 500 c.c. of water). Bring the water with the salt in it to a boil in a saucepan placed directly over the flame. Add the barley paste slowly, stirring constantly to prevent lumping. Boil for 15 minutes over a low flame, stirring frequently, strain, make up to 500 c.c. by adding water if any has boiled away, bottle, and keep on ice. Do not mix with milk until it is cool. **Barley Flour**

Protein Milk, Known as Albumin Milk, Eiweiss Milch, Casein Milk, also Finkelstein's Milk.

Method I: Heat 1000 c.c. of raw whole milk to 100° F. and stir in 10 c.c. to 15 c.c. of essence of pepsin or liquid rennet. Let it stand at 100° F. until it coagulates (about ½ hour) and forms a firm curd. Cut in squares with a knife and let it stand until the whey separates (about ½ hour). Hang the curd in a bag made of 3 or 4 thicknesses of gauze or one thickness of cotton cloth and let it drain for from 30 minutes to 1 hour, or until all the whey is drained off. Usually 700 c.c. of whey is thus obtained. Do not stir the curd or squeeze it while it is draining. Scrape the curd from the gauze into a very fine wire strainer and with a wooden spoon force it through the strainer 2 or 3 times. Five hundred c.c. of sterile water and 500 c.c. of buttermilk or skimmed lactic acid milk (see preparation) are added during the process. Beat with a Dover egg beater for 1 minute. To sterilize protein milk, add 1 level tablespoon of wheat flour. Make a smooth paste by first adding it to a few tablespoons of the protein milk, then the entire amount is added slowly. Boil in a saucepan over a low flame 2 minutes or more as ordered. Cut back and forth constantly with a large wooden spoon while boiling. If any has boiled away, make the amount up to a quart by adding sterile water. The composition (see note 1) of this food is: **Protein Milk Method I** **To Sterilize** **Composition**

Fat	2.5%	(Finkelstein and Meyer)
Sugar	1.5%	
Protein	3.0%	
Salts	0.5%	

One quart contains about 405 calories

To Add Sugar Sugar in the form of dextri-maltose is usually ordered in protein milk as soon as the baby's condition will allow it. The desired amount of sugar is added to the pint of sterile water and is dissolved in it by heating. Cool before mixing with the curd.

Protein Milk Method II *Method II:* (Originated by Dr. C. A. Stewart of Minneapolis.)

Boil 1000 c.c. of whole milk for 2 minutes, stirring constantly. Cool it to below 100° F. and add 5 to 10 c.c. of chemically pure lactic acid, which precipitates the curd at once. Pour it into a fine wire strainer to drain off the whey, which is thrown away. At least 700 c.c. of whey should be obtained. This will take only a minute. With a wooden spoon force the curd through the strainer 2 or 3 times. Five hundred c.c. of sterile water and 500 c.c. of buttermilk or skimmed lactic acid milk are added during the process. Beat with a Dover egg beater for 1 minute. This method is advantageous because it is simpler than Method I. The curd is softer and thus goes through the strainer more readily. It saves several hours of time and the final product is sterile if specially prepared skimmed lactic acid milk is added in place of commercial buttermilk. The composition is the same as that of protein milk prepared by Method I. Sugar may be added as directed in Method I.

Substitutes for Protein Milk Owing to the difficulty in preparation or as the result of efforts made at improvement, many substitutes for protein milk have been recommended and some of them are produced commercially and are on the market.[3] Among these are Hoos' milk and Larosan milk.

[3] Griffith, J. P. Crozer, M.D., "Diseases of Infants and Children."

Hoos' Albumin Milk.

Hoos' Albumin Milk

This consists of dried casein milk of a strength and composition to produce, when properly diluted, the original formula of Finkelstein. To prepare—pour 1000 c.c. of sterile water into a bowl and place 90 grams of milk powder on the surface of the water. Mix by beating 1 minute with a Dover egg beater, strain, and bottle.

Larosan Milk.

Larosan Milk

Add ⅔ of an ounce of Larosan powder to ½ pint of milk and mix thoroughly. Another whole pint of milk is heated to the boiling point. When it has come to a boil, it is added to the Larosan milk mixture and the whole is placed over a flame and is allowed to boil for 5 minutes, being stirred all the time. This is diluted with water in the proportion of ½ Larosan milk and ½ water, or ⅔ Larosan milk and ⅓ water. This mixture, because of its high protein content and comparative ease of preparation, can be used as a substitute for protein milk in the home.

Precipitated Casein—Cottage Cheese.

Precipitated Casein

Method I

1. Cottage cheese can be made by allowing either skimmed or whole milk to become sour. Heat slowly to 100° F. or until the whey begins to separate from the curd. Pour it into a gauze bag (3 to 4 thicknesses of gauze) to drain off the whey. Add salt to taste to the curd.

Method II

2. Casein may be precipitated by the use of liquid rennet or essence of pepsin as in making protein milk by Method I. Use either raw skimmed or whole milk (1000 c.c.) Heat to 100° F. and add 10-15 c.c. essence of pepsin or liquid rennet, let it stand at 100° F. until it coagulates (about ½ hour). Pour into gauze bag (3 to 4 thicknesses of gauze) to drain off the whey. Add salt to taste to the curd. Liquid rennet or essence of pepsin will act only in raw milk.

Method III

3. Casein may be precipitated by the use of chemically pure lactic acid, as in making protein milk by Method II. Use

either skimmed or whole milk. Boil it 2 minutes, stirring constantly, cool to below 100° F., and add 5-10 c.c. of lactic acid to a quart of milk. The curd is precipitated at once. Pour it into a fine wire strainer to drain off the whey. Add salt to taste to the curd. This method is advantageous because the curd is sterile, since it is made of boiled milk.

Malt Soup

Malt Soup (See Note 3).

1. One and one-half ounces of wheat flour (6 level tablespoons) are mixed with 10 ounces of whole milk. Add a few tablespoons of milk to the flour and make a smooth paste, then add the rest of the milk slowly, stirring to prevent lumps and strain.

2. One and three-quarter ounces of malt soup extract are added to 20 ounces of warm water. The two mixtures are then added one to the other, and the whole is heated slowly to boiling, meanwhile stirring constantly. Enough water is finally added to replace that which has evaporated, strain, bottle, and keep on ice. The percentage composition of this mixture is:

Composition

Fat	2.1 %
Carbohydrate	13.84%
Protein	2.86%

It has about 625 calories per quart.

Mead's Dry Malt Soup Stock Powder.

Mead's Dry Malt Soup Stock Powder

Mead's Dry Malt Soup Powder may be used in place of malt soup extract. Mix 9 level tablespoons of the malt soup stock powder with water and make formula as given above.

Buttermilk Mixture.

Buttermilk Mixture

Buttermilk has been used as a food for infants since at least as early as 1770 and good results have unquestionably been obtained with it. (See note 1.)

1. Add 2 level tablespoons of wheat flour to a quart of buttermilk. To do this first add a few tablespoons of the

buttermilk to the flour and stir together until a smooth paste is formed, then add the remaining buttermilk. Bring to a boil in a saucepan directly over the flame, stirring constantly, Remove from the fire for 5 minutes.

2. Bring to boil the second time, stirring constantly. Remove from fire for 5 minutes.

3. Add 4 level tablespoons of cane sugar and bring to a boil the third time, stirring constantly. Make up to the original quart by the addition of water, bottle and keep on ice.

Lactic Acid Milk.[4]

There are 2 kinds of lactic acid milk: **Lactic Acid Milk**

1. Skimmed lactic acid milk is made by inoculating skimmed milk with a pure culture of lactic acid bacilli. This is what is known as commercial buttermilk.

2. Whole lactic acid milk is whole milk which has been inoculated with a pure culture of lactic acid bacilli.

Commercial buttermilk is not ordinarily fit for use in infant feeding, since it is likely to be contaminated by undesirable germs. If it is boiled the curd forms a tenacious mass which cannot be broken up enough to feed through a nipple. Flour **To Boil Buttermilk** added to buttermilk will hold the curd in suspension by its colloidal action and the buttermilk can be boiled to sterilize it. Use 2 tablespoons of wheat flour to a quart of buttermilk. Mix an ounce of buttermilk with the flour first to make a smooth paste, then add the remainder of the buttermilk, stirring until it is well mixed.

A pure lactic acid milk can be made in the following way: **To Prepare**

Sterilize 900 c.c. of whole milk by boiling 2 minutes in a **Sterilize Milk** saucepan directly over the flame. Pour into a sterile quart milk bottle, cover with a sterile square and let it stand until it is below 100° F. Then inoculate with culture of lactic acid **Inoculate** bacilli, about a tablespoon of culture to 900 c.c. of milk. Put **Incubate** the bottle in an incubator to keep it at 100° F. for 12 hours

[4] Marriot, Wm. McKim, "Artificial Feeding of Athreptic Infants." *Journ. Am. Med. Assn.*, Oct. 18, 1919.

or until the milk thickens. Different strains of culture require varying lengths of time. If no incubator is available, the milk may be put into a fireless cooker, a thermos bottle, or a thermo-pack. It has been successfully coagulated by placing the bottle on a warm radiator. When it is thick, remove it from the incubator and place on ice.

Skimmed lactic acid milk is prepared in the same way, using skimmed milk. The properly prepared lactic acid milk is thick, creamy, and homogeneous. Too long a period of incubation, too high a temperature, or contamination of the milk results in the separation of the curds and whey. Karo syrup is the sugar ordinarily used with lactic acid milk. As stated above this is made up into a 50 per cent solution to facilitate the handling of it. To make this, mix 45 volumes of Karo syrup with 55 volumes of water and sterilize by boiling, put in a sterile bottle and keep on ice. Do not mix with milk until cool.

Karo Syrup

To Prepare Formulæ of Lactic Acid Milk

To prepare lactic acid milk formulæ strain the milk before using to break up the curd. Mix with water and Karo syrup in the proportions ordered. The use of a Dover egg beater will help to thoroughly mix the Karo syrup with the milk. Bottle the mixture and keep it on ice. Do not boil lactic acid milk unless flour is added and do not heat over 100° F. The culture of lactic acid bacilli does not need to be renewed oftener than every 2 or 3 weeks if it is carefully handled. Skimmed lactic acid milk can be used as a culture, inoculating new milk from the old. Bulgarian bacilli cultures are the most serviceable, but other lactic acid producing organisms may be employed.

Culture

Butter-Flour Mixture of Czerny.[5]

Butter-Flour Mixture

Put 7 grams of butter in a saucepan and heat over a slow flame until foaming occurs, and until any odor of volatile

[5] Griffith, J. P. Crozer, M.D., Mitchell, A. Graeme, M.D., "Some Remarks on Diet in Infancy with Special Reference to Employment of Czerny's and Kleinschmidt's Butter-Flour Mixture." *N. Y. Med. J.*, Aug. 3, 1921.

fatty acid has disappeared. This requires from 3 to 5 minutes. Seven grams of fine wheat flour are then added and the mixture is again boiled over a gentle fire with constant stirring until the mass becomes thin and of a brownish color (4 or 5 minutes). One hundred c.c. of warm water and 5 grams of cane sugar are added. The whole is again boiled, is rubbed through a fine sieve, and is then mixed with the desired amount of boiled, cooled milk, and is kept cold until it is needed for use. The addition of salt is not necessary, since this is contained in the butter. For children under 3000 grams in weight ⅓ milk is added to ⅔ of the butter-flour mixture. For those of 3000 grams or over ⅖ of milk and ⅗ of butter-flour mixture are employed.

Composition

Percentage composition of stock solution of butter flour mixture:

Fat	5%
Carbohydrate	10%
Protein	0.5%

One ounce (30 c.c.) of this mixture contains 26.6 calories.

Peptonized Milk.

Peptonized Milk

Dissolve the contents of a tube of pepsin in 60 c.c. of cool water and add to the amount of milk indicated in the directions (usually 500 to 1000 c.c.). Allow it to stand at 100° F. to 105° F. for 20 to 30 minutes, or a shorter time if the least bitter taste is discovered. The mixture is then quickly cooled and is kept on ice, or, better, is heated quickly to boiling.

Thick Cereal Mixture for Infants.

Thick Cereal Mixture

A thick cereal mixture may be ordered for a baby with persistent vomiting, especially if the diagnosis is pylorospasm. The consistency of the food is the important point in the preparation of thick cereal feeding.[6] Sauer advises 1 part

[6] Sauer, L. W., "Further Contribution to the Study of Pyloric Stenosis." *Am. J. Dis. Child.*, Aug., 1921.

of cereal to 7 parts of fluid or a 15 per cent cereal in the mixture.[7] Measure the desired amounts of milk, water, sugar, and salt, and mix them in the inner container of a double boiler. Add farina in proportions of 15 per cent of total mixture and cook for 1 hour in a double boiler, stirring frequently. The food should be so thick that it will stick to the inverted container. As an example of the usual proportions of this thick cereal mixture, Sauer gives the following:

Skim milk	9 ounces
Water	12 ounces
Farina	6 tablespoons
Dextri-maltose	3 ounces
Salt	

To Feed Thick Cereal

To feed thick cereal mixture to an infant Sauer says, "A satisfactory way to give the food is to have the required amount of the prepared food in a cup which is immersed in a shallow saucepan containing hot water. By taking a little of the warm, thick cereal on the end of a tongue depressor it can very easily be placed far back in the open mouth and scraped off with another tongue depressor. A great deal of patience is usually required during the first few days since the infant will often keep the thick cereal in his mouth some time before swallowing it."

Experience at the University Hospital, University of Minnesota, and elsewhere leads to the recommendation of the use of the Hygeia nipple for feeding thick cereal. Cut a very large hole in the end, fill the nipple with the cereal mixture, and place it in the baby's mouth. Secure a glass rod which will just fit into the tip of the nipple and with it work the contents through the hole into the baby's mouth. His sucking will also help because this motion initiates the swallowing reflex.

[7] Chapin, H. D., M.D., "Use of Thick Cereal in Difficult Feeding Cases." *Med. Record.*, Sept. 24, 1921.

Beef Juice.[8]

Beef Juice

Take 1/4 to 1/2 pound of round steak and broil it slightly. Cut into small pieces and then press out the juice with a meat press or a potato ricer, and add a pinch of salt. Feed fresh or warm slightly before giving, but do not heat sufficiently to coagulate the albumin.

Scraped Beef.

Scraped Beef

Use round steak cut in strips 1 inch in width. With a teaspoon scrape off the pulp, being careful not to scrape off the long fibers.

Agar-agar Jelly.

Agar-agar Jelly

2 quarts water
6 heaping tablespoons of granulated agar-agar
Sugar—flavoring

Let agar-agar soak in water over night; boil in this water for a few minutes, strain, add sugar and the desired flavoring. Serve as a dessert with cream and sugar, fruit juice, or stewed fruit.

[8] Hess, Julius H., M.D., "Principles and Practice of Infant Feeding."

CHAPTER XIV

FOOD FOR THE CHILD

Foods Other Than Milk Which Are Given the Infant under 1 Year Old.

Orange Juice Orange juice can be given any normal baby of 2 or 3 months. The breast fed baby may have it to advantage; the artificially fed baby who has boiled milk must have it. Start with ½ teaspoonful strained and diluted half with warm sterile water; give it once a day at first, halfway between feedings, as at 12 noon or at 4 P.M.; feed with a spoon or from a nursing bottle. Gradually increase the amount so that by the end of a month the baby is having ½ ounce of orange juice diluted half with water; no sugar should be added. **Tomato Juice** It is believed that tomato juice (canned tomatoes) contains the same antiscorbutic vitamins as orange juice and may be substituted for it; strain and give the same as orange juice is given. **Prune Juice** Prune juice may be given at 3 or 4 months of age or younger if necessary to prevent constipation. The same method is used as in the giving of orange juice. **Cereal Water** Cereal water 5 per cent is used as diluent of the milk of the artificially fed baby after the first 2 or 3 months. Rice, barley, and oatmeal are the most commonly used cereals. (See rules for making cereal water, Chapter XIII.)

Cereals Both the breast fed baby and the artificially fed one may have cereal at 5 or 6 months of age. The finer milled cereals, as cream of wheat, farina, or Pillsbury's wheat cereal, also strained oatmeal or a 6 per cent barley jelly, may be prepared. The cereal should be mixed with water and salt and cooked for 2 hours in a double boiler. It should be very thick. Start with 1 teaspoonful of cereal once a day. It may be fed thick

or it may be mixed with 30 to 60 cc. of the regular formula. If the baby is breast fed use a milk mixture, ½ milk and ½ water (sterile); no sugar is used. Feed the cereal with a spoon and in this way start to teach the child to eat from a spoon. Give the cereal at the regular feeding time before the bottle feeding or nursing. Increase the amount so that in 1 month the baby is having 3 or 4 tablespoonfuls twice a day, before 2 feedings, as at 10 A.M. and 6 P.M.

Vegetables

Vegetables are given to both the breast fed and artificially fed baby when 7 or 8 months old. Carrots, spinach, peas, or string beans are the best. They should be seasoned with salt, well cooked, and mashed through a fine strainer. Save the water they have been cooked in because it contains vitamins and should be given to the child with the vegetable. Start with 1 teaspoonful once a day, and gradually increase so that in 3 or 4 weeks 2 tablespoonfuls are given twice a day, or 4 tablespoonfuls once a day. Feed the vegetable with a spoon before a regular feeding from the breast or bottle. It may be mixed with the cereal and both given at the same time if desired.

Toast

Toast or zwieback crumbs without butter may also be given at 7 or 8 months; soften the toast with the water the vegetables have been cooked in; start with a small amount and increase gradually.

Vegetable Soup

Vegetable soups and purées may now be started. Broths as chicken, lamb, or beef, may be added to the diet, but as a general thing a milk and vegetable soup is to be preferred to broth. These soups may be fed the child in a nursing bottle, from a cup, with a spoon, or used to soften his toast.

As soon as the baby has learned to take the above-mentioned foods satisfactorily, first one entire feeding (breast or bottle) should be dropped and should be replaced by some of these foods, and gradually other milk feedings should be omitted in the same way, so that by the time he is 10 or 11 months old he will be entirely weaned from the breast or bottle feedings. Drinking from a cup and eating from a spoon should be started

when food other than milk is first given, and should be encouraged so that he can carry these on successfully after he is weaned.

Diet at 9 Months

At *9 months* the following may be added to the diet:

Stewed celery, beet greens, swiss chard.
Inside part of baked apple (well cooked with a little sugar).

Apple sauce
Prune pulp } Cooked with sugar to make it palatable and strained.

To Wean from Breast

The breast fed baby, when he is being weaned, is given proper milk dilutions, increasing the strength gradually as his individual tolerance permits. He should be taught to drink this milk from a cup. By the time he is 10 or 11 months old and is completely weaned from the breast he should be having whole milk, not over 1 quart in amount, in addition to the above foods.

To Wean from Bottle

The artificially fed baby is gradually weaned from the bottle in the same way, teaching him to drink from a cup, and gradually increasing the strength of his milk mixture as his tolerance permits. Following is a daily schedule for a child *10 to 12 months old:*

Diet at 10 or 12 Months

6 A.M. Whole milk, 6-8 ounces, from a cup.

10 A.M. Fruit juice or apple sauce, etc., cereal with whole milk (no sugar), toast or zwieback without butter.

2 P.M. Vegetable soup or purée.
Toast, softened with water vegetables have been cooked in.
Generous serving of vegetable.
Fruit or fruit juice.
Milk, 4-5 ounces, if necessary.

6 P.M. Vegetable soup or purée or milk, 8 ounces.
Cereal with whole milk (no sugar).
Fruit or fruit juice.
Piece of zwieback without butter.

10 P.M. Milk, 6-8 ounces, if necessary.

From *12 to 18 months* the following may be added to the diet: **Diet from 12 to 18 Months**

Vegetables (strained)
- Squash (summer).
- Boiled onions.
- Asparagus (fresh).
- Swiss chard.
- Cauliflower.
- Stewed celery.
- Strained tomatoes.
- Beet greens.

Fruits (strained)
- Ripe bananas (baked).
- Apricots (stewed).
- Pears (stewed).
- Plums (stewed).
- Peaches (stewed).
- Rhubarb (stewed).

Meat

Crisp bacon occasionally

Desserts without raisins
- Junket.
- Bread pudding.
- Tapioca (plain).
- Baked custard.
- Cornstarch (plain).
- Rice pudding.

Cereals
- Cream of rye.
- Pettijohn's wheat cereal.
- Rice.
- Spaghetti.
- Macaroni.

Milk

24 ounces in 24 hours

Cottage Cheese

The number of feedings has been decreased to 3 regular meals, 7 A.M., 12 noon, 5 P.M.

From *18 to 24 months:* **Diet from 18 to 24 Months**

Add meats once a day (small serving)

Scraped or minced

Beef.	Lamb chop.
Lamb.	Sweetbread.
Mutton	Crisp bacon.

Desserts—Add
- Sugar cookies.
- Ginger snaps.
- Prune whip.
- Apple tapioca.

Milk

16 to 24 ounces a day

Daily schedule from *18 to 24 months:*

7 A.M.
Milk, 5-8 ounces.
Cereal—not strained—no sugar.
Toast with butter.
Fruit (stewed).

12 NOON.
Soup.
Baked potato.
Meat as in list (small serving).
Vegetable (generous serving).
Bread with butter.
Dessert as in list.

5 P.M.
Milk, 8 ounces.
Vegetable soup or cereal.
Bread and butter.
Stewed fruit with cookies or dessert.

Diet from 2 to 4 Years

From *2 to 4 years:*

Egg—begin by giving ½ egg boiled, poached, or scrambled once a week, increasing gradually to a whole egg 2 or 3 times a week, in place of meat at noon.

Continue only cooked fruits, not strained, except raw scraped apple, orange with pulp, overripe banana.

Cereals—all kinds, except uncooked, once or twice a day, not strained.

Meat—once a day—scraped or minced or finely cut if the child chews properly.

Vegetables—not strained—once or twice a day.

Potatoes—boiled or baked—once a day.

Milk—16-24 ounces.

Three regular meals.

Diet from 4 to 10 Years

Diet list for children from *4 to 10 years:*

Milk—16-24 ounces a day.
Butter.
Egg once daily—boiled, poached, or scrambled.
Cottage cheese.
Meat once a day—no fried meats.
Chicken, boiled, baked, broiled.

Turkey, boiled, baked, broiled.
Lamb, roast or chop.
Beef, minced, roast, or beefsteak.
Mutton, minced or roast.
Bacon, crisp.
White fish, boiled or broiled.
Sweetbreads.
Liver.
Oysters.
Meat juice as gravy, not thickened with flour.

Soups—cream soups, purées, vegetable soups.

Cereals—all cooked cereals, including corn meal, hominy grits, wheaten grits, etc., macaroni, spaghetti. No uncooked cereals.

Breads

- Toast—dry or milk toast.
- Stale bread
  - Wheat
  - Graham.
  - Whole wheat.
- Zwieback.
- Plain unsweetened crackers.
- Corn bread.
- No hot breads, fresh breads, muffins, etc.
- Plain educator crackers.

Vegetables

Fresh asparagus.	Potatoes.
String beans.	Lima beans.
Peas.	Cauliflower.
Carrots.	Onions.
Spinach.	Cooked tomatoes.
Celery.	Baked egg plant.
Swiss chard.	Beets.
Squash.	Turnips.
Lettuce.	Parsnips.

Fruits—given with meals, never between meals.

- Raw fruits.
- No uncooked berries.
- Orange, including pulp.
- Apples.

Grape fruit.
Grapes without seeds.
Peaches.
Pears.
Baked bananas—not raw.

Desserts

Junket.
Plain rice pudding.
Plain cornstarch pudding.
Baked custard.
Prune whip.
Ice cream, vanilla—once or twice a week.
Plain cake.
Cookies
  Sugar cookies.
  Ginger snaps.
Tapioca pudding.
Apple tapioca.
Bread pudding.
Plain gelatin.
Jello.
Candy—simple kinds after dessert, never between meals.

It is impossible to follow absolutely any diet list or schedule because every child is an individual and all general rules must be modified to meet his particular needs. Also eminent authorities in all parts of the country disagree upon various points in children's diets. Research is constantly being carried out along these lines and the results of investigations are daily giving us new facts and are forming new theories. (The lists given here have been approved by Dr. E. J. Huenekins of Minneapolis.)

Essential Points in Diets of Children

From such data as is given concerning the energy requirement of children one may assume that it is so high that they cannot gain at a normal rate without a good appetite and good digestion. One of the special needs of the school child as well as of the infant, is to have his diet so selected and his meals so arranged that he can ingest day after day from one-half to twice the amount of food which would suffice for

an adult of the same size without taxing the alimentary tract unduly.[1] The diet of school children should emphasize:

a. Regularity of meals.
b. An adequate number of meals.
c. An even distribution of the amount of food.
d. Bland, simple, and easily digested natural foods, as milk, cereals, bread, and potatoes, free from high seasonings.
e. The quantitative requirement expressed in terms of:
   1. High energy.
   2. Protein sufficient for growth.
   3. A rich and varied supply of ash constituents.
   4. A liberal supply of vitamins.
   5. Foods that demand mastication.
   6. Foods that prevent constipation.

In addition to the care in the selection of foods and intelligent education in eating habits, the child must have regular hygienic habits in general, including plenty of rest and sleep and freedom from overwork and excitement.[1]

Dr. Dennett[2] says that the foods that do the child the most good are: first, milk; second, vegetables; third, cereals; and fourth, bread stuffs.

Milk.

The same precautions against the contamination of milk **Milk**
used for the infant must be followed throughout childhood. It has gone out of style to call milk the "perfect food," since no one food is that for the human organism (except breast milk during the first year of life) and all foods are good in their way. However, milk may be considered the cornerstone for the construction of an adequate diet since it tends to make good the deficiencies of other foods in a variety of directions. It can also be utilized as a carrier of other foods, as cereals, eggs, vegetables, bread, etc., in children's diets. Milk must not be given in excess, to the exclusion of other foods. (See

[1] Rose, Mary Swartz, "Question of Child Feeding." *Modern Hospital,* Nov., 1919.

[2] Dennett, Roger, M.D., "Some Dietetic Problems of Infancy and Childhood." *Modern Hospital,* June, 1921.

note 1.) The general opinion is that from a pint to a pint and a half is sufficient in 24 hours for the child.[3]

Vegetables.

Vegetables

Recent scientific knowledge is early (at 7 to 8 months) introducing vegetables into the diet of the child because of the iron and vitamin content. They are given well cooked and strained up to 18 months or 2 years. The water in which the vegetables have been cooked is saved because it contains many of the valuable properties of the vegetable; it may be given with the vegetable; it may be used to soften the toast; or it may be made into a vegetable soup with milk. The child who has not been accustomed to eat vegetables at an early age may refuse them when they are offered to him; this is especially true of the poorly trained child often admitted to the hospital. In such a case there should be a rule that he can have no dessert until he has eaten his vegetables, and he will soon learn to eat them.

Cereals.

Cereals

Cooked cereals have a definite place in the daily diet of the child; beginning at 2 or 3 months the artificially fed baby has cereal water in his milk; the breast fed baby and the artificially fed baby both have cereals at 6 months. From the first they should be given without sugar and in this way the child will never develop the desire for sugar on his cereal. (All cereals taste alike if they are sweetened.) Uncooked cereals should be avoided. Children like them so well that an occasional exception may be made, as on Sunday morning, when a spoonful of dry cereal may be sprinkled on top of the cooked cereal.

Fruit.

Fruit

Not only do children like fruits, but they are also valuable aids in their diet because of the vitamin content, fuel value,

[3] Von Der Bogert, Frank, M.D., "Limitations of Milk in the Diet of the Older Child." *Albany Med. Annals,* May, 1921.

and laxative quality. Orange juice because of its antiscorbutic properties is given at 2 or 3 months. Prune juice can be added soon after, and can be given for constipation at almost any age. Only cooked fruits are given to children under 2 years (except orange juice) and uncooked fruits are given very sparingly until after 4 years. Oranges and scraped raw apples are the exceptions. Fruit should be given as part of the regular meal, and should not be given between meals.

Meat.

There is much discussion as to when the child may be given meat. (See notes 1 and 2.) The above outline allows a small portion of scraped meat once a day beginning at 18 months. A little crisp bacon may be given after 12 months. **Meat**

Broth.

Broth may well be replaced by vegetable or milk and vegetable soup in the diet of the child.[4] **Broth**

Beef Juice.

Beef juice has formerly been used in the child's diet particularly to the exclusion of everything else to supply iron. Now green vegetables are being largely substituted for it, because they are less expensive, easier to produce, and contain vitamins not contained in the beef juice. The extractives of the meat contain stimulating properties which are not desirable for the young child. (See note 1.) If beef juice is given it should never be heated sufficiently to coagulate the albumin. (See directions for preparing.) **Beef Juice**

Eggs.

The yolk of egg is rich in iron, but there is considerable difference of opinion as to how children tolerate it. Half an egg is given at first once a week, gradually increasing the amount and frequency until a whole egg is given several times a week in place of meat. **Eggs**

[4] Leo-Wolf, C. G., M.D., "Nursing in Diseases of Children."

Sugar.

Sugar

Dr. Dennett says that in his children's diets he allows them no added sugar and that even then they get more than they should have. (See note 2.) Certainly no extra sugar need be put on cereals or other foods, and if the baby never has his food oversweet, he will never develop the taste for it.

Candy.

Candy

Candy, besides tending to cause indigestion, is bad for children's teeth and should be strictly limited. The desire for it is largely a habit started by curious and ignorant parents to amuse themselves by watching the child's reaction to the sweet taste. If properly trained, the child may very well do without candy. If it must be given it should be limited to a piece or two directly after meals and included as part of the dessert. It should never be allowed unless all the meal including vegetables, etc., has been eaten.

Ice Cream.

Ice Cream

Simple vanilla ice cream may be given as dessert once or twice a week, but not often enough to establish a habit. Ice cream cones between meals should never be tolerated.

Foods to Avoid

Foods forbidden to children under 4 years old and avoided until 7 or 10 years old (with a few exceptions): [5]

Meats.

All fried meats, ham, sausage, pork of all kind (except crisp bacon), salt fish, corn beef, game, goose, duck, meat dressings, meat stews, and gravy made from grease or drippings.

Vegetables.

Fried vegetables of all varieties, raw or fried onions, radishes, cucumbers, raw tomatoes, green corn.

[5] Hess, Julius H., M.D., ''Principles and Practice of Infant Feeding.''
Holt, L. Emmett, M.D., ''Diseases of Infancy and Childhood.''
Morse, John L., M.D., ''Care and Feeding of Children.''
Griffith, J. P. Crozer, M.D., ''Diseases of Infants and Children.''

Fruits.

All dried fruits unless steamed or stewed, bananas unless baked, or overripe; all fruits out of season and unripe, sour, stale, or wilted fruits; strawberries, gooseberries, blueberries, pineapple.

Breads and Cake.

All hot, fresh bread, rolls, or muffins; buckwheat and all other griddle cakes; all fresh sweet cakes, particularly those containing dried fruits and those heavily iced.

Desserts.

All nuts, candies, pies, tarts, pastry of every description; all heavy, doughy or very sweet puddings; also all salads, jellies, jams, syrups, preserves, and other highly seasoned foods.

Drinks.

Tea, coffee, alcoholic beverages, soda water, and cocoa should be avoided. The latter stimulates and also causes the child to think he must always have some warm drink and he will later substitute tea or coffee as a matter of habit.

Straining of Food and Mastication.

Straining of Food and Mastication

The oral hygienist tells us that in order to prevent dental disease foods must be selected which require thorough mastication, for the use of the teeth is one of the most important points in their preservation and development.[6] Food, as vegetables, fruits, etc., for the small child must be strained; but as soon as he has enough teeth, usually 18 months to 2 years, the straining should be done away with and he should be taught to thoroughly masticate his food. Every meal should contain a portion of hard or dry bread, as rye crisp, which requires chewing.

[6] Talbot, F. B., M.D., "Relation of Diet to Development of Children, with Special Reference to the Teeth." *Medical Annals of N. A.*, March, 1919.

Food Habits.

Food Habits

Regularity of Meals

Regularity in eating is absolutely essential to health. This regularity should be started at once with the newborn baby and should be continued throughout childhood. In this manner his mind is trained to the idea and he will always continue his regular habits. At first the baby has 5 feedings every 24 hours until he is 9 or 10 months old, when 2 feedings are omitted gradually so that by the time he is 12 months old he will have 3 regular meals. His heaviest meal should be at noon.

No child under 2 years should be permitted to sit at the family table. If possible it is better for the child under 4 years to have his meals served separately. If this cannot be done, he should be so trained that he will take it as a matter of course that he has his own food and that the family may eat other things.

Eating between Meals

Eating between meals is the most pernicious of all dietetic habits and should never be tolerated. (See note 3.) Too much emphasis cannot be brought to bear upon the importance of this, and there should be no exceptions made to the rule.

Water

Water should be served with all the meals and given between meals. The small baby should be offered water once or twice daily and oftener in hot weather. Older children should be encouraged to drink a considerable amount. When a child complains of hunger between meals give him a drink of water.

Serve in an Attractive Manner

Children's meals ought to be served in an attractive manner, both in the home and in the hospital. There are beautiful little dishes with blue birds, bunnies, etc., on them which give the child great delight. He should be given these dishes from the first and should be taught to respect them and to be careful not to break them. In this way he will soon learn to take great pride in them. It is a mistake to give the child unbreakable dishes fearing that he will break the others. Give him the others and assume that he will be careful of them.

Variety of Food

Children, especially small ones, do not demand much

variety in their food unless ideas are put into their heads by adults. On the other hand a child cannot be expected to sit down to exactly the same articles of food every day. A reasonable variety is advisable to stimulate his appetite. He must be taught to eat any new food without comment. There are many articles of diet to which the child of pre-school age has to become accustomed; these should be given to him gradually, being careful not to express doubt as to his liking or eating them. When preparing food see that cold foods are served cold, and that warm foods are served warm; but also see that the food is not hot enough to burn the child. Prepare the small child's food for him; cut his meat, etc., gradually teaching him to do this for himself when he is able to do so, thus developing independence. His eating habits should, however, be carefully supervised. At meal time prepare him for his meal, teach him to wash his face and hands before eating (also after eating); put his bib on him and let him sit down to his little table in a chair which will bring him to a proper level with the table; place his food before him and express no doubt as to his eating it. Serve small portions, thus teaching him to eat everything on his plate. He should be taught to be neat in his eating habits; untidy habits show lack of training on the part of the parents. The small child just beginning to eat has to be fed, but he must be taught to handle a spoon and to feed himself as soon as possible. A small spoon with a short handle is much easier for him to handle at first; later, after he has learned to use the spoon, he should be given a small fork and should be taught the different uses of the spoon and fork. He must not be allowed to dawdle over his food or to play with it; on the other hand he must not eat too fast, but must be instructed to thoroughly masticate his food, and he should be given foods that require chewing. (See note 6.) If a child of any age persists in eating too fast the habit may be overcome: (1) if another person feeds him every mouthful of food until he learns to eat properly (this method will not take many days); or (2) he

Teach Child to Eat Properly

may be given a very small spoon, as a salt spoon, with which to eat.

If a Child Refuses to Eat

Never consult a child about what he wants to eat any more than he would be consulted about the selection of a new coat or shoes. He is no more capable of choosing one than the other. Never put notions into his head about food by saying that he will not eat this or that, or by discussing the likes and dislikes of other people in front of him. Excepting only an idiosyncrasy in regard to some special food (which is rare) any healthy child should be taught to eat, without question or objection, any food that is put before him. Educate him as well as train him; tell him why certain foods are good for him and others not. A good rule is never to allow a child his dessert until he has eaten a sufficient amount of other food, including his vegetable.

The Normal Child

If a normal, healthy child refuses his food, and it is simply because of some notion that he does not like it, or does not wish for it, do not waste time arguing with him, and do not use bribery, threats, deception, or force. After he has been given a reasonable amount of time in which to eat it, take it away and offer him nothing else. Let him go hungry until the next meal time. Then offer him the same kind of food he refused before; continue to do this until he consents to eat.

The Sick Child

The sick child who refuses to eat is a different problem from that of the well child, because going without food may do him a definite harm. In such a case the nurse or mother must be guided by the baby's condition and the doctor's orders. The utmost patience and skill, and the greatest possible understanding of child psychology is necessary on the part of the nurse to win out. Never cater to the whims of his appetite, for he often is craving the very foods he should not have. Here again deceit must never be used; bribery and threats are also avoided and it is seldom necessary to resort to force. It is always safe to deprive the child of his dessert if he refuses other food.

Often the sick child should take large quantities of liquids

as part of his treatment. There may be more or less difficulty in making him drink. Sometimes if he is given a straw to drink through the novelty will stimulate him to take more fluids. The very sick child who cannot sit up to drink has to take his fluids through a bent glass drinking tube, a straw, or an especially designed feeder. Often a small child or one who is delirious will bite the end of the glass tube; in this case a small piece of rubber tubing may be substituted.

The School Child

The diet of the school boy or girl has to be just as carefully watched as that of the younger child. If he has had proper training early in life there will not be much difficulty when he is older. See that he gets up early enough to allow him to eat his breakfast leisurely; (also to allow him time to go to the toilet before going to school). Sufficient time must also be allowed him for lunch at noon. Lunches, as a drink of milk, etc., at school during the morning or afternoon are not necessary for the normal healthy child who eats three adequate meals at home. Such lunches should be given only with the doctor's orders, as in cases of malnutrition or if the child's home conditions are poor, not allowing him sufficient food.

READING REFERENCES

HOLT, L. EMMETT, M.D.—*Care and Feeding of Children.*
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CHAPTER XV

URINE AND STOOL IN INFANCY AND CHILDHOOD

Care of Buttocks.

A baby's buttocks need special care since they are very frequently irritated with soiled diapers. In an institution diapers should be changed every time the baby has a defecation and as much oftener as possible, at least every four hours. He should not be taken from his bed to have this done, but a buttock tray containing the following articles and a basin for soiled diapers may be taken to the bedside (the tray may be a basin 12 x 8 inches and 2 inches high):

When to Change Diapers

Buttock Tray

1. A paper bag for waste:
2. A tray of various sized safety pins.
3. A bottle of unsterile oil to wash buttocks.
4. A basin 4 inches in diameter for oil.
5. A jar of unsterile cotton pledgets—made of second grade cotton and made the size of a walnut.
6. A jar of 5 per cent lysol containing the handling forceps.

To Clean Buttocks

A child's buttocks are washed every time his diaper is changed. Remove the soiled diaper, wiping the buttocks free of feces with it; put it in the basin and place a clean diaper under the child. Remove a cotton pledget from the jar with the handling forceps and dip it into the pan of oil; place the forceps back in the antiseptic, take the pledget between the fingers, and wash the buttocks with it. It may be necessary to use several pledgets to clean the buttocks and genitals. Never dip a pledget back into the pan after using it. When cleaning a baby girl's buttocks care must be taken not to infect the urinary tract with fecal matter; wash the genitals first, separate the labia and wash under the folds, sponging away from the urethra; then clean the buttocks, wiping down-

ward away from the genitals. Excoriated buttocks may be caused by:

Cause of Excoriated Buttocks

1. Lack of care of the buttocks.
2. Improper laundering of the diapers.
3. Frequent acid stools.
4. Ammoniacal urine.

To Prevent Ammoniacal Odor of Diapers

If a healthy child's diapers are changed when he is wet or soiled, his buttocks washed with oil and his diapers properly laundered, he should have no trouble with excoriated buttocks. No other treatment is necessary. If there is a strong odor of ammonia and a dermatitis of the diaper region results,[1] this ammoniacal fermentation can be eliminated by the use of antiseptics in the diaper and the dermatitis will disappear. After washing the diapers soak them in a solution of mercuric chlorid 1 :5000, wring well and dry before using. (Laundering of diapers discussed under clothing—diapers, Chapter III.) The hospital ward should be equipped with a covered enamel pail for soiled diapers; they should not be put with the general soiled linen. The fecal material should be washed from them at once with a brush, holding them under running water. Wet diapers are rinsed when removed and all are put in the covered pail until laundered.

Care of Wet or Soiled Diapers

To Prevent Excoriated Buttocks from Acid Stools

If a baby has excoriated buttocks which are due to frequent diarrheal stools, make every attempt to keep him dry all the time. If the stools or urine are strongly acid wash the buttocks with sodium bicarbonate solution 5 per cent to neutralize the acid, then apply any soothing ointment as lanolin or a mixture of equal parts of zinc oxid ointment and castor oil, or mutton tallow and lard (Dr. F. C. Rodda). Open-air treatment sometimes helps; place the child on a Bradford frame (details under collection of a 24-hour specimen of urine). Instead of using the adhesive method of collecting the urine, place a piece of absorbent cotton over the genitals to absorb the urine and change this frequently. The stools go

Open-Air Treatment for Excoriated Buttocks

[1] Cook, J. V., M.D., "Etiology and Treatment of Ammonia Dermatitis of the Gluteal Region of Infants," *Am. J. Dis. Child.*, Nov., 1921.

immediately into the basin below the buttocks and the child never has to lie in a wet or soiled diaper.

Bed Pans.

Bed Pans

Separate bed pans should be provided for every child in the hospital and urinals for every boy. These can be kept in a rack in the service room; they should be cleaned well and sterilized once a week and after the discharge of a patient.

To Give a Bed Pan

To give a bed pan to a child, screen the bed, warm the pan by holding it under warm water, dry it, cover with a bed pan cover made of ticking or heavy unbleached cotton, and take it with the toilet paper to the patient. Stand on the right side of the bed if possible, have the child flex his knees with his heels resting upon the bed, place the left hand under his buttocks and lower back, raise him up enough to slip the bed pan under him with the right hand, and lower him on to it. To remove the bed pan, have the child flex his knees, put the left hand under his back to raise him from the pan and remove it with the right hand. A folded towel or a pad put over the part of the bed pan with which the patient's back comes in contact makes it more comfortable for him.

Care of Child after Use of Bed Pan

After removing the pan the nurse must use the toilet paper, for the child cannot do it efficiently himself. If he has a defecation and cannot be well cleaned with toilet paper he must be sponged clean; to do this, fill his basin with warm water and bring it to the bedside with pieces of waste cotton and a paper bag. Sponge him clean and dry his buttocks.

Care of bed pan.

The bed pan must be washed thoroughly after use with the hopper brush and warm water and dried.

Stool Specimen

A specimen of stool is usually routine for every child admitted to the medical service and as soon as possible after admission. All unusual stools should be saved for the doctor's observation.

The Urine in Infancy and Childhood.

Frequency of Urination

A small baby urinates frequently when awake, 2 or 3 times an hour, but much less frequently when asleep. He will often

be found dry after several hours of sleep but will urinate immediately after waking. It is possible to train a child of a year or even younger so that he never, or seldom, wets his diaper. Infants of 3 months have been trained to go without a diaper except at night. By the time a child is 2 years old he should have learned to indicate his desire to urinate; at 3 years he should have sufficient control of his sphincter muscles not to wet the bed at night; if he has not, extra fluids in the late afternoon should be restricted; he should empty his bladder just before going to sleep, and he should be taken up to urinate at 10 P.M. and once or twice after that, as necessary.

Daily Average Amount of Urine

Average amount of urine passed in 24 hours:[2]

Age	*Ounces*	*Grams*
1st 24 hours	0 to 2	0 to 60
2d 24 hours	⅓ to 3	10 to 90
3 to 6 days	3 to 8	90 to 250
7 days to 2 months	5 to 13	150 to 400
2 to 6 months	7 to 16	210 to 500
6 months to 2 years	8 to 20	250 to 600
2 to 5 years	16 to 26	500 to 800
5 to 8 years	20 to 40	600 to 1200
8 to 14 years	32 to 48	1000 to 1500

Appearance of Urine

The urine of the newborn is usually highly colored. The reaction at first is strongly acid; the specific gravity is 1.010 to 1.012 and it is in proportion to the amount voided. Later, as fluids increase, it becomes lighter, almost straw colored, is slightly acid or neutral in reaction, the specific gravity is lower, 1.004 to 1.016, and remains thus throughout childhood. Any unusual appearance of the urine or any unusual odor must be noted and reported. The newborn often has a pinkish stain on his diaper which may be mistaken for blood; this may be due to the urates or uric acid crystals which are deposited in the tubules of the kidney during intra-uterine life. As the kidney begins to function they are dissolved and excreted. The condition, however, should always be reported

[2] Holt, L. Emmett, M.D., "Diseases of Infancy and Childhood."

as the differential diagnosis demands a microscopical examination.

To Collect Urine Specimen from Child

To collect urine for examination. A single urine specimen and a 24-hour amount are collected from the older child as from the adult. It is often difficult to collect urine from the small child who is incontinent. There are various methods employed.

To Collect Urine Specimen from a Baby Boy

To collect urine from a baby boy.

FIGURE 20. TEST-TUBE ON A BOY TO COLLECT URINE

Equipment

Equipment:

Test-tube.
Adhesive.
Bandage—2 pieces long enough to tie the legs to the crib side.

Wash the genitals with soap and water and dry. Inspect the edge of the test-tube for nicks which might cut the baby. It is safer to always bind it with adhesive. Place his penis in the test tube and hold in position with narrow strips of adhesive from the tube up over the pubis. It is advisable to tie his legs to the side of the bed with a bandage so that he cannot kick the tube off. A finger cut from an old glove and with the tip cut off can be attached to the test tube with

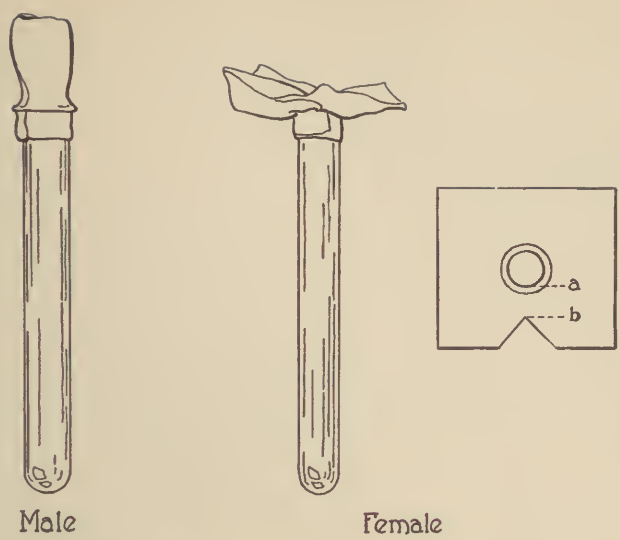


FIGURE 21.—TEST-TUBE WITH GLOVE FINGER FOR OBTAINING URINE FROM A BOY. TEST-TUBE WITH GLOVE FINGER FOR OBTAINING URINE FROM A GIRL. THE DISTANCE FROM *a* TO *b* SHOULD EQUAL DISTANCE FROM THE RECTUM TO THE VAGINA.

FIGURE 22. TEST-TUBE ON A GIRL TO COLLECT URINE

a narrow strip of adhesive and the penis put into the glove finger. By this method the test-tube does not come in contact with the skin to irritate it.

To Collect Urine from Baby Girl

To collect urine from a baby girl.

Adhesive Method

(1) Adhesive method.

Equipment

Equipment:

Bandage—2 pieces long enough to tie the legs to the crib side.
Adhesive.
Test-tube or Erlenmeyer flask.

Wash the genitals with soap and water and dry. Bind the top of the test tube with adhesive; take a piece of adhesive 2 or 3 inches square, depending on the size of the child; slit it in the middle in 4 ways making a hole large enough to put the tube through; adjust the adhesive to the outside of the tube and make it secure with a narrow strip of adhesive. Cut out a triangular piece from the middle of one side of the adhesive so that the distance from the tip of the triangle to the rim of the test-tube is the same as the child's perineum. Fit this directly over the perineum so that the opening of the tube is directly over the meatus and vulva and the triangular opening fits over the rectum on either side. Strap the other edges of the adhesive around the vulva on the sides and reënforce all sides with narrow strips of adhesive. The child's legs are tied to the side of the crib so that she will not kick the tube off. If the hips are elevated by a small pillow under them there is a downward flow of urine which aids in collecting it. The test-tube may be prepared with a glove finger as for the baby boy; the top of the finger is attached to the center of the adhesive square in the same manner.

Use of Cotton Belt

(2) To collect urine without adhesive a belt can be made of cotton cloth with an opening in the center in which the test-tube fits; the rim of the tube must be bound with adhesive. The belt fastens around the abdomen and the straps are brought around the groin and fastened. The belt can be used for boys or girls, but it is more successful for boys. It is

especially valuable if the baby's skin is too sensitive to stand the application of adhesive or if a daily specimen has to be obtained over a long period of time.

Make Pressure over Bladder

(3) A specimen of urine can often be obtained by holding a child over a basin and making slight pressure over the bladder or by putting a cold application over it. This is successful in most cases if the child has not urinated for some time, especially if awakened after several hours of sleep.

Use of Absorbent Cotton

(4) If other methods fail and the skin is too irritated to permit the use of any kind of apparatus, a piece of absorbent

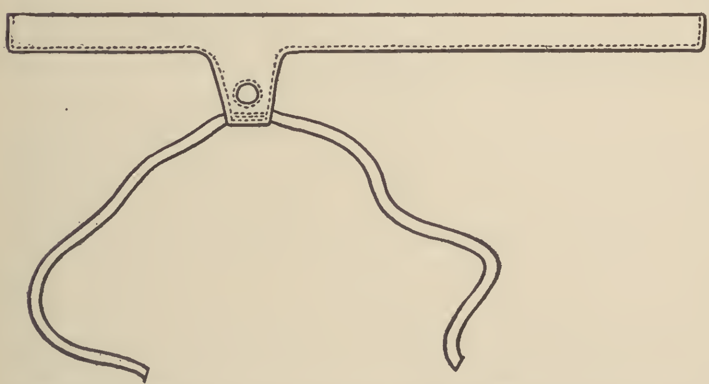


FIGURE 23. COTTON BELT TO HOLD TEST-TUBE FOR COLLECTING URINE

cotton may be put in the diaper over the genitals and if the child urinates without having a stool, the urine can be squeezed from the cotton into a specimen glass.

Use of Rubber Ring

(5) Another method is to allow the child to lie on a small rubber air cushion with a hole in the center and a basin under it. The surrounding portion of the bed is built up with pillows to the level of the cushion and the infant with diaper removed and his legs tied to the sides of the bed is allowed to lie with his buttocks over the hole in the cushion until urine is passed into the basin.

Baby Urinals

There are various kinds of baby urinals (as Spicer Infant Urinal) on the market which are more or less successful, but

the adhesive method has been used the longest and seems the most satisfactory in the end.

Routine Urine Specimen

A specimen of urine must be obtained from the child as soon as possible after admission to the hospital. A 24-hour specimen, beginning the second 24 hours after admission, is usually routine for every child admitted to the medical service. In most institutions it is the responsibility of the night nurse to obtain these. When a specimen is ordered for a baby it is essential that an attempt to collect it be made early in the evening; then if the first attempt is not successful there is time for a second. It should be one of the duties of the nurse on evening duty to put test-tubes on all babies when specimens are ordered.

To Collect a 24-Hour Specimen of Urine from Infant

To collect a 24-hour specimen of urine from a baby.

There are various methods used.[3] A satisfactory method is the use of the Bradford frame. Select a frame that is longer and wider than the child's body; cover it with a canvas which has a hole three-fourths of the distance from the top. (This is where the child's buttocks will come.) Cover the canvas with sheets to protect it, pinning them on the under side. Fold an abdominal binder to fit the child and pin it on either side of the frame where his body will come; place him on the frame with his rectum directly over the opening in the canvas and hold him in this position by pinning the binder tightly around his abdomen. Restrain his legs by tying a piece of bandage around each ankle and pinning it to the canvas on either side of the frame. In cold weather put stockings on his feet and pin them to the abdominal binder or to the canvas; put a shirt on him, back side in front, and fasten only the top button so that there will be no hard surfaces under his body. Elevate the frame on blocks high enough to allow a bed pan or basin to be slipped under the buttocks to collect feces. Have the frame several inches higher at the head than at the

[3] Courtney and Fales, "Comfortable Arrangement for Separate Collection of Urine and Feces of Male Infants." *Am. J. Dis. Child.*, Dec., 1915.

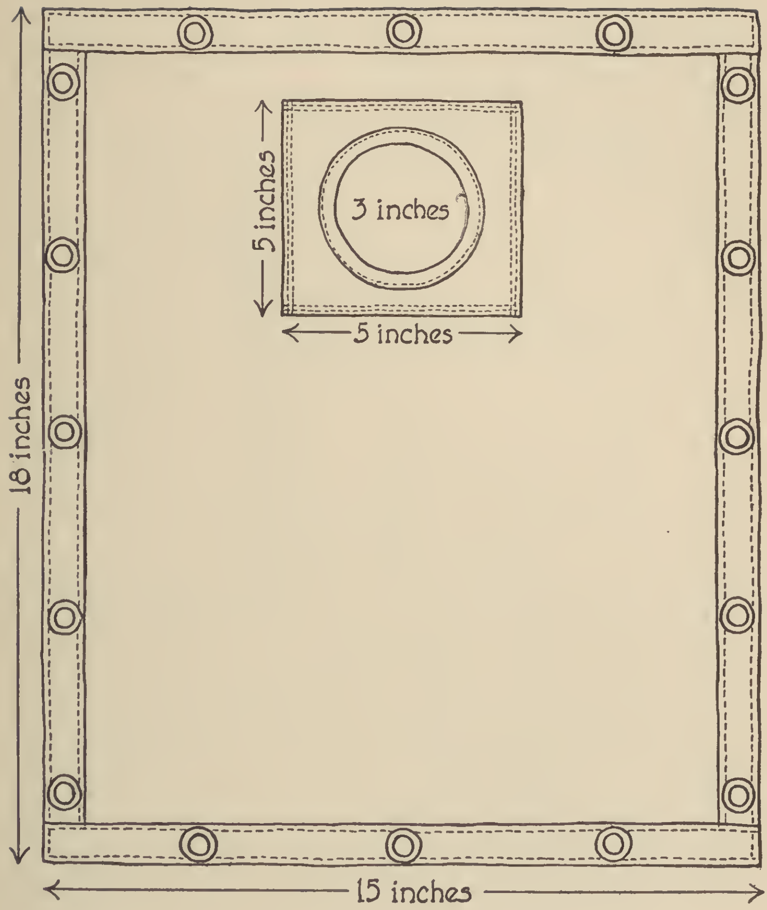


Figure 24. Canvas Cover for Bradford Frame

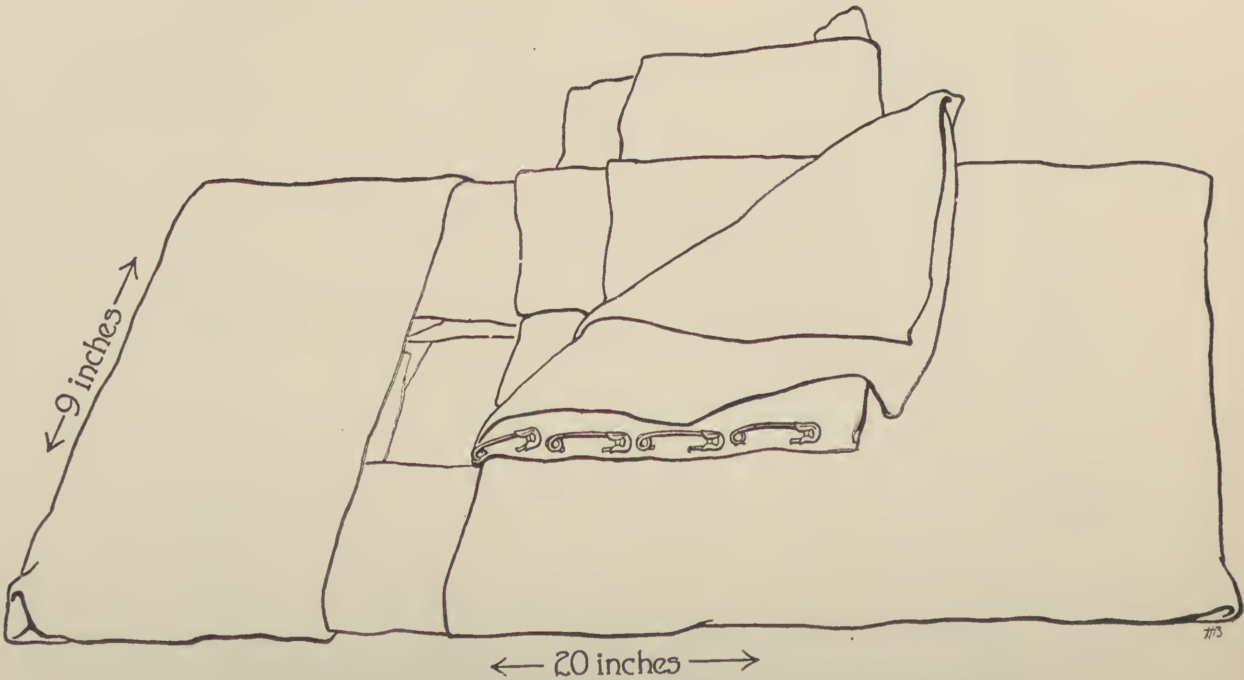


Figure 25. Frame Prepared for Collection of 24-hour Specimen of Urine

foot. Rolls of blanket can be placed at the sides of the frame to prevent draughts reaching the child from the open spaces under him. In cold weather hot water bottles may be necessary around him to keep his temperature up to normal. For the collection of the urine use the adhesive method (as described above). Instead of a test-tube, use 2 pieces of rubber tubing connected by a glass connecting tube; attach a glove finger to one end, adjust it to the child, and put the other end of the tube in a bottle tied to the side of the crib. A 24-

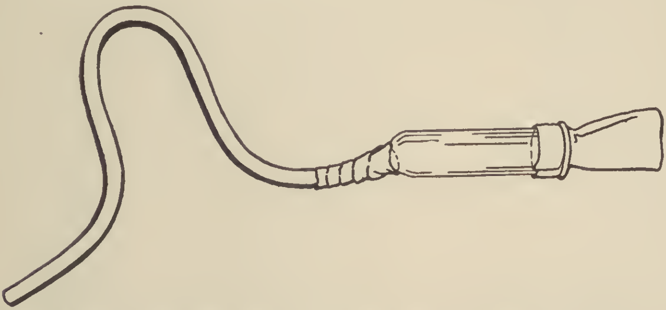


FIGURE 26. TUBE FOR THE COLLECTION OF A 24-HOUR SPECIMEN OF URINE

hour specimen of urine may be collected from a baby girl in this way, but it is more difficult than from the boy; close surveillance is necessary and the adhesive has to be changed several times a day. If the perineum is well covered so that the feces cannot contaminate the urine, it is successful. If the adhesive is run through a flame to heat it before applying, it will stick better. A collodion dressing over the adhesive at the perineum will help to keep it in place. If a child is kept on a frame for any length of time, his back will need special care. To have this done he can be turned on his face once or twice daily immediately after he has urinated.

The Stools in Infancy and Childhood.

Intelligent observation of a baby's stools,[4] whether he is sick or well, is essential because abnormal stools are the first **Importance of Intelligent Observation of Stools**

[4] Morse and Talbot, "Diseases of Nutrition and Infant Feeding."

FIGURE 27. BABY ON THE FRAME FOR THE COLLECTION OF A 24-HOUR SPECIMEN OF URINE

signs of many illnesses, and much trouble can be forestalled by recognizing the first symptoms.[5] The stools of all infants in a hospital are saved as a matter of routine because they furnish valuable aid in judging a patient's condition. Abnormal stools and stools of older children suffering from digestive disturbances are saved daily for inspection. Every baby whose stools are saved should have a pail marked with his name into which the napkins containing them are put. This pail should be about 7 inches in diameter; it should have a bail or handle and a tightly fitting cover. Every child's pail can be kept on a shelf in the service room (if the covers fit tightly there will be no disagreeable odor). If possible it is best to keep them in a specially constructed cupboard ventilated by an open window. When the doctor is expected to make rounds they can be taken to the bedside and the napkins can be opened out on the inside of the cover of the pail. A tongue blade makes a convenient spatula with which to examine them.

To Save Infant's Stools for Inspection

When examining stools note:

Points to Note Regarding Stools

1. The number of stools during 24 hours.
2. The size of the stool.
3. The consistency of the stool.
4. The color of the stool.
5. The odor of the stool.
6. The reaction of the stool.
7. The presence of abnormal material, curds, mucus, blood, undigested food (in older children), pus and membrane.

Number of Stools

1. The normal breast fed baby has from 3 to 5 stools daily, while the artificially fed baby has from 1 to 3 and is more subject to constipation. However, individual babies differ; some may have only 1 a day and sometimes only 1 every 2 days and still may be normal.

Size of Stools

2. The size of the stool depends on the number in 24 hours and upon the amount of food ingested. If all the stools are small the nurse may suspect that the baby is not having

[5] Dunn, Charles H., M.D., "Pediatrics."

enough food. If he passes large ones he may not have more than 1 a day or 1 every 2 days.

Consistency of Stools

3. The normal breast fed baby passes soft stools of the consistency of pea soup, while the normal artificially fed baby passes firmer ones, salve-like in consistency and often formed. Constipation causes them to be more firm. Frequent stools are watery, usually the looser they are the more severe is the diarrhea. A loose stool which is foamy or frothy when first passed suggests an excess of carbohydrates in the diet.

Color of Stools

4. The usual colors are brown, yellow, white, green, black, gray, pink, and blue. The color may change, therefore it should be examined at once for accurate interpretation. **Brown** Brownish yellow stools are normal for the breast fed baby, but are also caused by cereal water, by dextri-maltose, or by malt soup mixtures in the diet. **Yellow** Yellow stools are normal for the baby who is fed on cow's milk. **White** White ones are due to an excessive amount of undigested fat which is in the form of soaps; they are usually quite firm and dry. **Green** Green stools are the most common abnormal stools; they may be any shade from the lightest grass green to a very dark green, the darker the green the greater the significance. Occasionally a normal looking yellow stool will turn green after exposure to air; this has no significance nor are one or two light green stools significant in either a breast fed or an artificially fed baby. However, frequent green, watery stools are significant. Green stools are seen in all types of indigestion and are not characteristic of any one form; they do indicate that food has passed rapidly through the bowel and that bile has not had a chance to undergo a complete change. **Black** Black stools are due to the presence of undigested blood or to the action of some drug as iron, bismuth, or charcoal. **Meconium** The first stool of the newborn, the meconium, is dark greenish brown, almost black. A starvation stool also is dark green, nearly black resembling meconium; it is sometimes constipated and sometimes watery. **Gray** Gray stools indicate the absence of bile and

the excess of fat, the latter generally in the form of soap. Both pink and blue stools are seen occasionally and are due to an unknown change of bile pigments. **Pink** **Blue**

5. The odor of the stools depends upon the composition of the infant's food, the rapidity of digestion, the absorption, and the degree of bacterial activity. The normal stool of the breast fed baby has a strong aromatic odor. The odor of fat indigestion is that of butyric or lactic acid; that of carbohydrate indigestion is of lactic or acetic acid; and that of an excess of protein is a cheesy, fecal odor. Stools composed mostly of mucus have a peculiar aromatic odor. Infections and ulcerations of the intestines cause stools to have a foul, putrefactive odor like decayed meat. **Odor of Stools**

6. The reactions of stools will be influenced by contamination with urine; therefore to test them accurately be sure that they are not contaminated. The normal reaction of the stool of the breast fed baby is slightly acid and depends largely upon the relative quantities of protein, fat, and carbohydrate in the diet. An excess of fat or carbohydrate will cause acid and frequent stools while an excess of protein will cause alkaline stools. **Reaction**

7. a. There are 3 kinds of curds found in baby's stools:— **Curds**

(1) The casein curds are found in sizes varying from that of a small bean to that of a peanut; they are white or yellowish, so tough that they cannot be broken up, and so light that they will not sink in water. They are found only in the stools of babies fed on raw milk.

(2) Fat curds are small, soft, and the self-same color of the stool; they are easily broken up by pressure. If they are rubbed on a piece of tissue paper it will have an oily appearance when it is dry.

(3) An excess of mucus in a stool may become dry and form in ball-like curds. When broken down with a spatula they are more tenacious than fat curds.

Mucus b. Mucus in stools may be recognized by its glistening, shiny appearance; it is present in most normal stools but should be seen only microscopically. If seen macroscopically it is abnormal and is generally seen in large quantities; the larger the quantity the more serious is the diarrhea. An excess is caused by any condition which irritates the intestine, thus causing an oversecretion of the mucous glands. Stools composed chiefly of mucus and blood suggest infectious diarrhea or intussusception. Undigested starch may be mistaken for mucus but may be distinguished by staining blue with iodin.

Blood c. Blood on the outside of a hard, constipated stool indicates trauma to the rectum. Blood mixed with mucus in a watery stool indicates serious inflammation of the intestines. Blood and mucus alone are seen in cases of intussusception. Scurvy causes blood findings in the stool. Blood in the stool of the newborn suggests hemorrhagic disease. Old digested blood causes the stool to be black.

Pus d. Pus findings in a stool indicate an inflammation and ulceration of the intestinal wall; it may be yellow or white and may look very much like mucus, but is less tenacious.

Membrane e. Membrane in stools indicates severe inflammation of the large intestine. It is rarely seen and then only when a patient is in a very critical condition.

Undigested Food f. Undigested particles of food may be seen in the stools of older children who are on a general diet.

Meconium Meconium of the newborn is sometimes passed before birth, during birth, or directly after birth as is usually the case. It is dark brownish green, semi-formed, tenacious, composed of mucus, bile, intestinal secretions, cells, vernix caseosa, epithelial cells, and hairs swallowed with the amniotic fluid. The baby passes 4 to 6 of these stools in 24 hours. After 2 days they grow lighter, become streaked with brown, and gradually change so that in 4 or 5 days they are

Stools of Breast Fed Baby the normal golden yellow stools of the breast fed baby. The breast fed baby has 3 to 5 stools in 24 hours which are a

golden yellow color, of the consistency of pea soup, slightly acid, and of a slightly sour but not unpleasant odor. It it not unusual to find soft, fine curds and some mucus in the stools of the breast fed baby; if the child seems healthy and is gaining in weight they do not have the significance that they have for the artificially fed baby. The infant fed on cow's milk will have fewer stools (1 to 3 in 24 hours) which are firmer, more formed, salve-like in consistency, lighter, more yellowish in color, neutral in reaction, and of a more foul, fecal odor.

Stools of Artificially Fed Baby

Establishment of Regular Toilet Habits

Any healthy infant can be taught to have regular bowel movements every day. After 1 or 2 months he can be placed on a small chamber at regular intervals, once during the morning and at bedtime in the evening. This is best done after a feeding, since the taking of food stimulates peristalsis. The nurse holds the chamber or small basin between her knees and holds the baby over it by placing her hands on his buttocks and supporting his back and head against her chest. In order that he may know what is expected of him his rectum may be irritated by inserting a suppository of gluten or cocoa butter. Inserting a thermometer or an oiled glass rod will often produce a stool with less irritation than the suppository.[6] Gentle massage of the abdomen may stimulate sufficient peristalsis to produce a stool. In a very short time the baby will learn what is expected of him and no stimulus will be required. In this way he is helped to establish regular habits which will never be outgrown and at the same time the nurse or mother is being saved endless trouble. There are cases on record where with careful training babies as young as 3 weeks of age have been taught never to soil their diapers. When the normal healthy child is 5 or 6 months old he may sit on the nursery chair regularly for a few minutes several times a day. As soon as he is old enough to understand (about 1 year old) he can be taught

[6] Eggleston, C., M.D., "Appliance for Training Infants to Stool." *Journ. Amer. Med. Assn.*, Jan., 1918.

to indicate his desire to urinate. It takes persistent effort on the part of the mother or nurse and can hardly be carried out in a hospital. Children in a home, however, should be trained early. Frequently a well trained child of 1 or 2 years is admitted to a hospital but by the time he is discharged he has entirely forgotten his training. This may be due to the carelessness of the nurse in answering or interpreting the child's calls. In order to prevent this from happening the nurse should consult the child's mother about his habits and signs so that the training started by the mother can be continued.

CHAPTER XVI

NURSING TECHNIQUE IN MINOR SURGICAL PROCEDURES

1. To Sterilize Articles Used in Procedures.[1]

To Sterilize Articles Used in Procedures

Tubing, stopcocks, glasses, mixing bottles, beakers, syringes, medicine droppers, small basins, needles (with wires in them), boil 5 minutes.

Applicators, pledgets, gauze squares, and towels, keep sterile in covered jars in which they have been sterilized in autoclave.

Handling forceps keep sterile in 5 per cent lysol solution.

Scalpel, paracentesis knife, soak in 95 per cent alcohol for 10 minutes.

2. To Set Up a Sterile Tray.

To Set Up Sterile Tray

Remove the sterile towel from the jar with handling forceps and with the aid of a second pair of forceps open and spread it on the tray. Use 2 towels if 1 is not large enough to completely cover the edge of the tray. With the forceps place the sterilized articles on the sterile towel.

3. To Set Up a Tray, a Part of Which Is Sterile.

To Set Up a Tray, a Part of Which Is Sterile

Lift a towel from the jar with the handling forceps; open and spread over one-half of the tray with the free end hanging from the tray. With the forceps place the sterile articles on the towel and turn the free end back over the set-up tray. Arrange the unsterile articles on the other half of the tray.

[1] University Hospital Routine, University of Minnesota.

4. Care of Tubing and Stopcock after Use.

Care of Tubing and Stopcock after Use

Drop in cold water at once and as soon as possible rinse them by forcing water through with a syringe. Use a small brush to clean the stopcocks. Boil in water for 5 minutes or force 1 per cent lysol through with a syringe and leave it in for 15 minutes. Rinse and dry tubing by stripping. Complete the drying by forcing air through by means of a rubber bulb.

5. Care of Needles after Use.

Care of Needles after Use

Drop at once into cold water; scrub with Bon Ami and ammonia; boil 3 minutes or leave in a 1 per cent lysol solution for 15 minutes. To dry needles fill a syringe with ether and expel it through the needle several times. With a rubber bulb blow out every drop of fluid. When dry replace the wire which has been dipped in liquid albolene.

6. Venipuncture.

Venipuncture

Purpose

Veins from Which Blood May Be Obtained

It is often necessary to obtain blood for diagnostic purposes. In an adult this is usually taken from (a) one of the large veins of the elbow (*median basilic* or *median cephalic*). In the child, especially under 5 years, this vein is often difficult to see or feel and it is impossible to obtain blood here. Some other sources from which blood may be taken are: (b) *External jugular* at either side of the neck; (c) the *femoral vein* in the groin; (d) the *popliteal vein* at the back of the knee; (e) in the emaciated child (especially the child with congenital syphilis) the *large scalp veins* are very prominent; (f) in the child under 18 months the *longitudinal sinus* in the area of the anterior fontanelle may be used; (g) if all other methods fail and there are no contra-indications, the heel may be pricked with the point of a sharp scalpel and the blood squeezed into a tube.

Equipment:

Sterile: **Equipment**

1. Four cotton pledgets.
2. Two small gauze squares.
3. One towel.
4. One medicine glass for 70 per cent alcohol.
5. One 10 c.c. syringe.
6. Two needles, 20-26 gauge, 1-1½ inches long.

Unsterile:

1. Small rubber square.
2. Towel.
3. Tourniquet (rubber tubing ¼ inch in diameter, 12 inches long).
4. Kidney basin.
5. Bottle of 5 per cent lysol solution with 2 pairs of handling forceps.
6. Medicine glass with cold water for used needles.
7. Container for blood.
8. Collodion.
9. Blanket and safety pins to restrain child.

Technique:

To Use Median Cephalic or Basilic Veins

a. If the blood is obtained from the median basilic or median cephalic veins, the technique is the same as for the venipuncture on an adult. The child lies on his back in the middle of his bed with his arm extended toward the doctor; roll his nightgown sleeve over his elbow. If he is at an age when he will struggle, pin a blanket around him, restraining the other arm and his legs. Place the rubber and unsterile towel under his elbow to protect the bed. Place the tourniquet in position under his upper arm; sponge a 4-inch area on the arm at the inner side of the bend of the elbow with alcohol. Dry with a dry pledget. Handle the sponges with the forceps and drop the soiled ones into the kidney basin. The doctor scrubs his hands. Hand him the sterile towel to wipe them; he then places the same over the child's lower arm and hand so that he will not come in contact with them while working. To hold the child's arm still place one hand under his elbow to hold it straight, and the

Position of Child

other hand over his hand under the sterile towel. After the blood starts to flow through the needle loosen the tourniquet. The blood is collected in the test-tube or container, whichever is necessary for tests. After the needle is withdrawn drop it in the glass of cold water. Apply pressure over the

FIGURE 28. POSITION OF BABY FOR PUNCTURE OF EXTERNAL JUGULAR VEIN

puncture with a dry sponge and elevate the arm until bleeding stops. If it persists, apply a collodion dressing. To do this wipe the puncture dry, place a few shreds of absorbent cotton over it, paint that with collodion on an applicator and keep the arm quiet until it dries.

To Use External Jugular

b. If it is impossible to obtain blood from the arm the *external jugular* vein may be used. The equipment is

the same without the tourniquet. (Figure 28.) The child lies with his shoulders elevated on a pillow, his head is lowered and turned to one side, where the nurse holds it in position. His arms and legs must be wrapped and pinned in a blanket. The rubber and unsterile towel are placed under his neck. A sterile towel is placed over the side of his face with which the doctor's hands come in contact. A 4-inch area over the vein selected is prepared by sponging with alcohol and drying. Blood is withdrawn in the usual way and the procedure is the same.

Position of Child

c. If the *femoral vein* is used, the child lies on his back with a pillow under his hips. Restrain him by pinning a blanket around his arms and shoulders, also one around his legs.

To Use Femoral Vein

d. If the *popliteal vein* is used, the child lies on his face and is restrained with the blanket as necessary. The inner side of the bend of the knee is exposed.

To Use Popliteal Vein

e. If the *scalp veins* are used, the child is restrained as necessary and his head is turned and is held to one side to expose the vein.

To Use Scalp Veins

f. *Fontanelle puncture* [2]

Fontanelle Puncture

Equipment:

Equipment

Sterile:

1. Four cotton pledgets.
2. Applicator.
3. Two small gauze squares.
4. One towel.
5. One medicine glass for 70 per cent alcohol.
6. One medicine glass for $3\frac{1}{2}$ per cent iodin.
7. One 10 c.c. syringe.
8. Two needles, 18-19 gauge, $1\frac{1}{2}$ inches long with stilets and needle guards.[3]

[2] Helmholz, Henry F., M.D., *Am. J. Dis. Child.*, Sept., 1915.
Fisher, L., M.D., *New York State Med. Journal*, May, 1919.
Fisher, L., M.D., *Med. Record*, Sept. 7, 1918.

[3] Goldbloom, A., M.D., *Am. J. Dis. Child.*, Dec., 1918.

Needles

There are many kinds of needles made for fontanelle puncture; most of these have a guard. If necessary, an ordinary needle, 18-19 gauge, 1½ inches long with bevel 0.75 inches long may be used.

Unsterile:

1. Small rubber square.
2. Towel.
3. Kidney basin.
4. Bottle of 5 per cent lysol solution with 2 pairs of handling forceps.
5. Medicine glass of cold water.
6. Test-tube or container for blood.
7. Collodion.
8. Razor.
9. Basin of soap solution.
10. Blanket and safety pins for restraining the child.

Position of the Child:

Position of Child

Pin his arms and legs tightly in a blanket. Place him crosswise in his crib with the top of his head even with the side of the bed; the doctor sits on a stool at the side of the bed on a level with the top of the baby's head. Have the tray on the table at his side. Place the rubber and towel under the child's head. Shave the hair from a 3-inch area over the posterior angle of the anterior fontanelle; sponge with alcohol and dry; with the forceps hand the sterile towel to the doctor to wipe his hands and to place under the child's head. The nurse stands on the opposite side of the crib from the doctor and grasps the child's head on either side with her hands to hold it absolutely still. The needle is inserted into the longitudinal sinus in the area of the anterior fontanelle, posteriorly as far as possible. The guard on the needle prevents it from slipping. After blood is obtained and the needle is withdrawn, drop it in a glass of cold water.

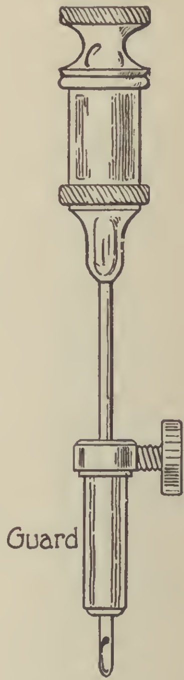


Figure 29. — A Needle with Guard for Puncture of Fontanel.

Hold the child upright and make gentle pressure over the puncture with a dry sponge to stop the bleeding. A collodion dressing may be used if necessary.

There is a "head holder" in use that holds the infant's head in position for fontanelle work; it is very difficult to do so with the hands. **Patent Head Holder**

Figure 30. Position of Baby for Puncture of the Fontanelle

If the child is put on a central dressing table for the puncture, he is placed with the top of his head level with the end of the table at which the doctor sits. The nurse stands at the side of the table and holds the head in the same way.

7. Ventricular Tap.

It is often necessary in hydrocephalus to relieve the pressure by withdrawing cerebrospinal fluid from the ventri- **Ventricular Tap Purpose**

cles. The needle is inserted through the anterior fontanelle to one side or the other of the midline. The equipment is the same as for a fontanelle puncture with the addition of a graduate to measure the fluid withdrawn. The needles used are 18 to 19 gauge, 3 inches long, with plunger (spinal puncture needles). The position of the child is the same as for a fontanelle puncture. Shave a 3-inch area around the spot where the needle is to be introduced. Take the child's pulse before starting and watch his condition closely during and after the puncture.

8. Intravenous Infusion.

Intravenous Infusion

Purpose

Sites of Infusion

A. It is often necessary to give a child fluid intravenously to increase the fluid intake, as in cases of anhydremia; medications are often given intravenously. Physiological sodium chlorid or glucose solution are the fluids most commonly ordered. The same veins may be used as mentioned under venipuncture. The vein in the arm can be used without difficulty in an older child. One of the other veins is usually chosen for a small baby, as the external jugular, a large scalp vein, popliteal, or femoral veins. Fluid may be given into the longitudinal sinus at the anterior fontanelle, but there are dangers connected with this method and it is generally used only as a last resort. It is estimated that an amount of fluid equal to 1/60 of the body weight can be introduced through the veins, but much more can be given if there has been an extreme loss of body fluid. (See note 2.)

Equipment

Equipment:

Sterile:

1. Six cotton pledgets.
2. Applicator.
3. Two small gauze squares.
4. Two sterile towels.
5. Medicine glass for 70 per cent alcohol.
6. Medicine glass for 3½ per cent iodin.
7. (a) One 30 c.c. syringe, or

(b) Three-way stopcock with 3 pieces of rubber tubing 18 inches long attached and syringe, or
(c) Gravity method—flask and tubing.

8. Two needles, 20-26 gauge, 1½ inches long.

Unsterile:

1. Small rubber square.
2. Small towel.
3. Kidney basin.
4. Bottle of 5 per cent lysol with 2 pairs of handling forceps.
5. Medicine glass of cold water.
6. Flask with solution to be warmed in a basin of water 105° F.
7. Collodion (or adhesive).
8. Tourniquet, if an arm vein is to be used.
9. Blanket and safety pins to restrain child.

Methods to Use

Three methods may be employed to give intravenous infusion.

Syringe Method

(*a*) A 30 c.c. syringe alone may be used if only a small amount of fluid is to be given.

3-Way Stopcock Method

(*b*) A *3-way stopcock* may be used; one rubber on it connects with a 20 c.c. syringe; one rubber has an adapter for the needle; and the third has a bent glass tube on the end and fits into the flask of solution. The procedure is the same as for a venipuncture. Air is expelled from the tube by turning the valve and by drawing fluid from the flask into the syringe, then by turning the valve again to force it from the syringe through the tube which is to be attached to the needle. The needle is inserted into the vein selected, the adapter on the end of the rubber is fitted in it, and the fluid is slowly injected by drawing it up into the syringe from the flask and then forcing it through the needle.

Gravity Method

(*c*) The *gravity method* consists of a graduated flask, 2 pieces of rubber tubing 12 inches long connected by a glass connecting tube with a clamp on one piece; one end of the rubber is attached to the flask, the other end has an adapter for the needle. The flask with the fluid 100° F. is hung on a

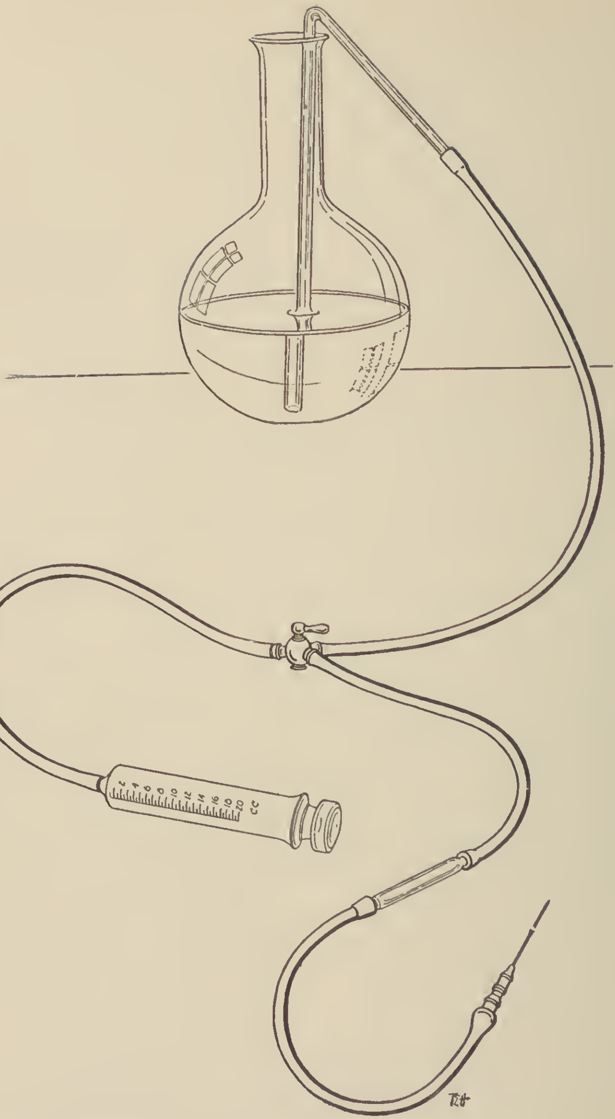


FIGURE 31. EQUIPMENT FOR GIVING FLUID INTRAVENOUSLY, USING 3-WAY STOPCOCK METHOD (b)

standard so that it is 2 feet above the child. A 4-inch area around the site is cleaned with iodin and alcohol and dried; air is expelled from the tube by allowing the fluid to run through it; the needle is inserted into the vein, the adapter is attached to it, and the fluid is allowed to run in by gravity after unfastening the clamp on the rubber tubing. Fluid may be given by the gravity method using a glass funnel in place of the graduated flask. This is suspended from a ring adjusted to a standard and has the same rubber connections. The fluid is measured, poured in, and allowed to run in by gravity.

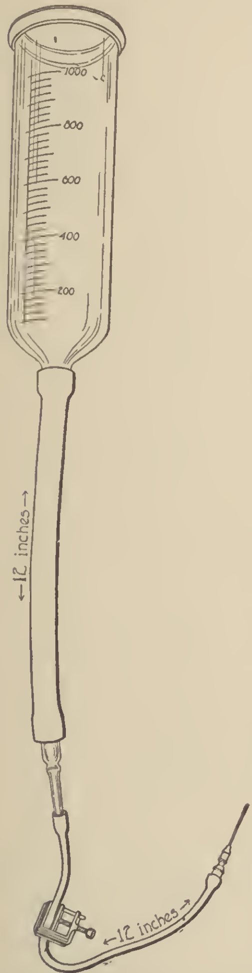


Figure 32.—Equipment for Giving Fluid Intravenously, Using Gravity Method (c).

After withdrawing the needle, drop it in a glass of water, make pressure over the puncture with a dry sponge, and seal it with a collodion dressing or with adhesive and cotton. Before starting to give fluid intravenously take the child's pulse and apply external heat if necessary. During the procedure watch his pulse and prevent unnecessary exposure. Leave him with hot water bottles if his condition indicates it and observe him frequently. **Watch Child for Reaction**

B. *Antitetanic serum* given for relief of tetanus may be given intravenously. Method (a) is usually employed. The serum must be warmed to 100° F. **To Give Antitetanic Serum**

C. *Salvarsan* employed in the treatment of syphilis is given intravenously. **To Give Salvarsan**

Equipment

Equipment:

Sterile:

1. Six applicators.
2. Eight cotton pledgets.
3. Two small gauze squares.
4. Two sterile towels.
5. Three needles, 20-26 gauge, 1-1½ inches long.
6. (a) 3-way stopcock with tubing and 10 c.c. syringe, or (b) Graduated flask for the gravity method.
7. Medicine glass for 70 per cent alcohol.
8. Medicine glass for 3½ per cent iodin.
9. Mixing bottle.
10. Graduated beaker.
11. Pipet.
12. Stirring rod.
13. Glass funnel.

Unsterile:

1. Small rubber.
2. Unsterile towel.
3. Tourniquet, if arm is used.
4. Kidney basin.
5. Bottle with thumb forceps in alcohol.
6. Medicine glass with cold water.
7. File.
8. Flask of freshly distilled cool sterile water.
9. Litmus paper.
10. Tube of salvarsan.
11. Bottle of sodium hydroxid 15 per cent.
12. Blanket and safety pins to restrain child.

To Prepare Salvarsan

To Prepare Salvarsan:

1. Pour 100 c.c. of freshly distilled water into a mixing bottle, to this add ½ of the salvarsan powder. Shake the bottle until it is well mixed. Then add the remainder of the powder, shaking the bottle until all the powder is thoroughly mixed.

2. Add 100 c.c. of distilled water and shake well.

3. Add 10 to 20 drops of 15 per cent sodium hydroxid solution or enough to make the solution alkaline. (Test by dropping on neutral or red litmus.)

4. Filter the solution through sterile cotton (placed in the funnel) from the mixing bottle into the graduated beaker. Filter back into the mixing bottle and continue until it appears perfectly clear.

Watch the child for reaction after the injection. Apply external heat if necessary. **Watch for Reaction**

D. *Neosalvarsan* is often given in place of salvarsan in the treatment of syphilis.[4] **To Give Neosalvarsan**

Equipment: **Equipment**

Sterile:

1. Six applicators.
2. Eight cotton pledgets.
3. Two small gauze squares.
4. Two sterile towels.
5. Three needles, 20-26 gauge, 1-1½ inches long.
6. Medicine glass for alcohol.
7. Medicine glass for 3½ per cent iodin.
8. Graduate marked in c.c. for mixing salvarsan.
9. 20 c.c. syringe.
10. Glass stirring rod.

Unsterile:

1. Small rubber sheet.
2. Towel.
3. Tourniquet, if arm is used.
4. Kidney basin.
5. Bottle of 5 per cent lysol with 2 pairs of handling forceps.
6. Medicine glass with cold water.
7. File.
8. Flask of freshly distilled cool sterile water.
9. Ampule of neosalvarsan.
10. Blanket and safety pins to restrain child.

Neosalvarsan is prepared by dissolving the contents of the ampule in freshly distilled water; the amount of water depends on the desired strength of the drug. It may be given by any of the 3 methods used to give intravenous infusions, **To Prepare Neosalvarsan**

[4] Jeans, P., M.D., "Treatment of Hereditary Syphilis," *Journ. Amer. Med. Assn.*, Jan. 15, 1921.

but since it is usually given in small quantities, it may easily be injected directly with a syringe: method (a). Any of the veins where an intravenous infusion may be given may be used for giving neosalvarsan. The position of the child depends on the vein used. (See directions above.) Watch the child closely for reaction after the injection. Apply external heat if necessary.

Sites to Give Salvarsan or Neosalvarsan

Watch for Reaction

Blood Transfusion

Purpose

"Citrate" Method

E. *Blood transfusion*[5] may be employed in the treatment of hemorrhage, various blood diseases, as hemophilia, anemia, malnutrition, and many other conditions. The methods are described as "surgical" or "citrate," the latter being the one referred to here. Both, however, utilize as an anticoagulant sodium citrate (C.P.) in a solution of freshly distilled water varying in strength from 1½ per cent to 3 per cent. Twenty c.c. of this solution is used for every 100 c.c. of blood which is given. The popular methods of administration have already been described under "intravenous infusions" above. Depending on the choice of the operator, these may be:

Methods of Giving Blood Intravenously

(a) Simple syringe.
(b) Three-way stopcock.
(c) Gravity.

Additional Equipment

Donor

The only additional materials needed will be a sterile graduate and a flask of sterile physiological saline solution. The donor is selected as for the adult with blood in the same group as the recipient. An anesthetic does not need to be given if the child is sufficiently quiet to allow the procedure to be successfully carried on without it. A sedative, as chloral hydrate by rectum, may sometimes be ordered a few minutes before starting. The very small child can always be restrained. The older child, unless he is delirious or too sick to be reasoned with, will also lie quiet. The child of the active age, between 2 and 6 years, will present many

[5] Hoffman and Habein, "Transfusion of Citrated Blood," *Journ. Amer. Med. Assn.*, Feb. 5, 1921.

difficulties and an anesthetic may have to be given. Before starting a transfusion take the child's pulse. Protect the body surface from exposure. It is also advisable to apply external heat to the lower extremities and an ice-bag to the head after the transfusion. Any evidence of reaction (chill, sudden rise in temperature, etc.) should be immediately reported. **Watch for Reaction**

9. Subcutaneous or Intramuscular Injections.

Subcutaneous and Intra-muscular Injections

A. *Whole blood* is sometimes injected subcutaneously or intramuscularly; this is especially valuable to check hemorrhage or hemorrhagic disease of the newborn. It is often given to older children to relieve various conditions. **Whole Blood** **Purpose**

Equipment: **Equipment**

Sterile:

1. Two applicators.
2. Four cotton pledgets.
3. Two towels.
4. Medicine glass for 3½ per cent iodin.
5. Medicine glass for 70 per cent alcohol.
6. Twenty-five c.c. syringe.
7. Needles,
   Two 18-20 gauge, 1-1½ inches long to obtain blood from donor.
   Two 18-20 gauge, 1-1½ inches long to inject blood in recipient.

Unsterile:

1. Two small rubber sheets.
2. Two hand towels.
3. One tourniquet.
4. One kidney basin.
5. Two pair handling forceps in 5 per cent lysol solution.
6. Collodion.
7. Glass of cold water.
8. Blanket and safety pins to restrain child.

The blood is taken from any healthy donor. The vein (usually in the arm) is prepared as for a venipuncture and the blood is withdrawn into the glass syringe. From 10 to **Donor**

30 c.c. of blood are usually given.

Sites of Injection

The sites of injection may be:

1. Either side of the back.
2. Either axilla.
3. Buttocks.
4. Outer aspect of the thighs.
5. Outer side of the calves.

A 4-inch area is prepared with iodin and alcohol and dried. Place a sterile towel over the part of the child's body with which the doctor's hands come in contact. The recipient must be ready to have the blood injected immediately that it is withdrawn from the donor, before it has time to clot. Gently massage the area where it is injected. After the needle is withdrawn, drop it into the glass of cold water and seal the puncture with a collodion dressing.

Diphtheria Antitoxin

Purpose

B. *Diphtheria antitoxin* is given as a prophylactic measure and as treatment for diphtheria.

Equipment

Equipment:

Sterile:

1. Glass of alcohol.
2. Glass of ether.
3. Six cotton sponges.
4. Ten c.c. syringe.
5. Two needles, 22-26 gauge, 1-1½ inches long.

Unsterile:

1. Kidney basin.
2. Jar of lysol with handling forceps.
3. Antitoxin warmed to 100° F.
4. Collodion.
5. Blanket and safety pins to restrain child.

Sites of Injection

Antitoxin is injected into the subcutaneous tissues or intramuscularly. Sites of injection may include:

1. Muscles of the buttocks.
2. Outer aspect of the thighs.
3. Axillæ.
4. Upper arm.
5. Calf of the leg.

The site is cleaned with alcohol, ether, and a dry sponge. After the serum is injected, gently massage the area to aid absorption. Seal the puncture with collodion. Care for the needles, etc., in the usual manner.

Tetanus Antitoxin

C. *Tetanus antitoxin* may be given intramuscularly or subcutaneously. The equipment and the procedure are the same as for giving diphtheria antitoxin. The serum must be warmed to 100° F.

Hypodermoclysis

D. *Hypodermoclysis.*

Purpose

(1) *Subcutaneous injection* of fluids is often indicated as in case of shock, following hemorrhage, if a child has lost fluids from excessive vomiting or diarrhea, or in case of dehydration from any cause. Salt solution is usually used; 5 per cent glucose solution may be used. The usual sites for injection are:

Sites of Injection

1. Under the breasts.
2. Either side of the back.
3. The axillæ.
4. The outer aspect of the thighs.
5. The outer aspect of the calves.
6. The upper arm.

Amount to Give

The amount given depends on the size of the child—a small baby under a year old can usually take 100 to 300 c.c. at a time, sometimes repeated twice a day or in daily injections. An older child can have more in proportion to his size.

Equipment

Equipment:

Sterile:

1. Two applicators.
2. Four cotton pledgets.
3. Two towels.
4. Medicine glass for iodin.
5. Medicine glass for alcohol.
6. (a) Graduated flask with 2 feet of rubber tubing with glass connecting tube inserted 6 inches from the needle end, a clamp on the rubber, and an adapter for the needle (as for intravenous infusion).

(b) Three-way stopcock with rubber and syringe (as for intravenous injection).

7. Two needles, 18-20 gauge, 1½ inches long.

   If a Y glass connecting tube is used on the end of the rubber 2 needles may be used at once. In that case include 4 in the equipment.

Unsterile:

1. Small rubber.
2. Small towel.
3. Kidney basin.
4. Glass of cold water.
5. Glass of 5 per cent lysol solution with handling forceps.
6. Collodion.
7. Flask with solution in pan of water 105° F. (Standard on which to hang flask.)
8. Blanket and safety pins to restrain child.

Position of Patient

Remove the patient's clothes to expose the area. Restrain as much as necessary by pinning in a blanket. Protect the bed with the rubber and towel. Prepare a 4-inch area with iodin and alcohol and dry it.

Gravity Method

(a) Expel the air from the tube by allowing the fluid to run through it. The needle is inserted and the fluid is permitted to run in by *gravity*. Gently massage the area where the needle is inserted. As the fluid enters, the needle must be partly withdrawn and is reinserted in a slightly different direction from time to time. (See gravity method (*c*) for giving intravenous fluid.)

3-Way Stopcock Method

(b) If the *3-way stopcock* is used, the fluid is drawn into the syringe from the flask, then is slowly forced through the needle. After the needle is withdrawn, drop it in the glass of water. Exert pressure over the puncture with a dry sponge for a few minutes until the fluid does not ooze from it. Seal it with collodion and sterile cotton or adhesive and cotton. (See method (b) for giving intravenous fluid.)

Continuous Hypodermoclysis

(2) *Continuous hypodermoclysis.* If the patient is in a critical condition and the injection of fluids is very essential, a continuous hypodermoclysis may be used, i.e., fluid is

allowed to run in by gravity over a period of hours until the desired amount is given. This can be employed only for the very small baby who is restrained or for the older child who understands the necessity of remaining quiet. It is impossible to carry out this procedure on an active child from 1 to 6 years. When it is used, the nurse must watch the child closely every 10 to 15 minutes. Take his pulse before starting the hypodermoclysis, place hot water bottles around him if necessary; expose him as little as possible. Take his pulse and watch him carefully during the hypodermoclysis and afterwards leave him with the hot water bottles.

Watch for Reaction

10. Intraperitoneal Injection of Fluids.[6]

Intraperitoneal Injection of Fluids

Purpose

Fluids are often given to an infant directly into the peritoneal cavity to increase the fluid intake in cases of anhydremia. Physiological sodium chlorid is used in most cases; 5 per cent glucose has been used.

Equipment

Equipment:

Sterile:

1. Two applicators.
2. Four cotton pledgets.
3. One sterile towel.
4. Medicine glass for iodin.
5. Medicine glass for alcohol.
6. Two needles, 18-20 gauge, 1½ inches long.
7. (a) Graduated glass container with rubber tubing, glass connecting tube, clamp, and needle adapter.
   (b) Glass funnel with rubber tubing, glass connecting tube, clamp, needle adapter, and graduate to measure fluid.

Unsterile:

1. Small rubber sheet.
2. Half sheet.

[6] *Am. J. Dis. Child.*, Jan., 1918.
Aikman, J., M.D., *Journ. Amer. Med. Assn.*, Jan. 24, 1920.
Gittings, J. C., M.D., Donnelly, J. D., M.D., "Clinical Value of Intraperitoneal Injection of Salt Solution," *Am. J. Dis. Child.*, Feb., 1922.

3. Kidney basin.
4. Glass with 5 per cent lysol with 2 pairs of handling forceps.
5. Collodion or adhesive.
6. Flask of solution to be used in a pan of water 105° F.
7. Glass of cold water for used needles.
8. Blanket and safety pins to restrain child.

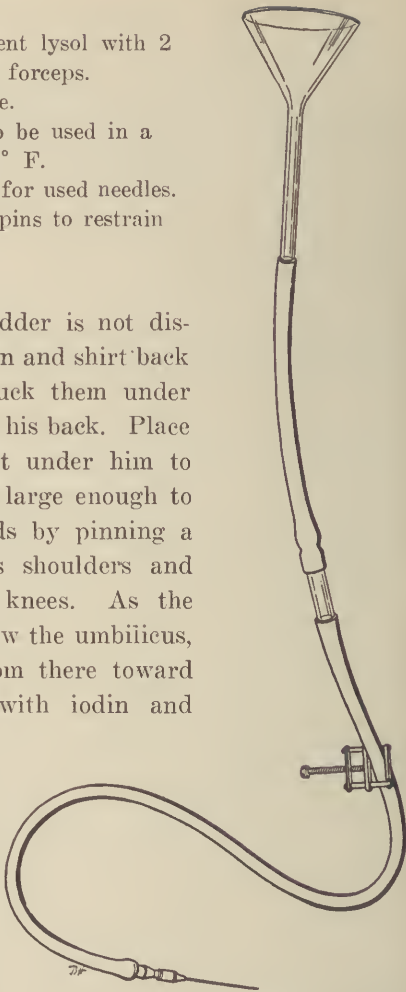


FIGURE 33.—GLASS FUNNEL AND TUBING FOR GIVING FLUIDS INTRAPERITONEALLY METHOD (b).

Position of Child

See that the child's bladder is not distended. Turn his nightgown and shirt back over the umbilicus and tuck them under him. He should lie flat on his back. Place the rubber and half sheet under him to protect the bed. If he is large enough to struggle restrain his hands by pinning a small blanket around his shoulders and another one around his knees. As the needle is inserted just below the umbilicus, prepare a 4-inch area from there toward the pubes by painting with iodin and alcohol and drying. Place a sterile towel directly below the prepared area. Air is expelled from the tube; the needle is inserted and the fluid (100° F.) is allowed to run into the peritoneal cavity.

Methods

Method (a) may be used. The graduated flask is hung from the standard two feet above the child. (See Gravity Method for giving fluid intravenously.) If method (b) is used the fluid is measured and poured into the funnel. From 100 to 400 c.c. of fluid may be given by this method, depending upon the

size of the child and upon the state of dehydration. The wound is sealed with collodion and cotton or adhesive and

FIGURE 34. POSITION OF CHILD WHEN GIVING INTRAPERITONEAL FLUID

Watch for Reaction

cotton. Observe the child's condition closely during the procedure. Expose him as little as possible. Give him hot water bottles if his temperature is subnormal.

Spinal Puncture

11. Spinal or Lumbar Puncture.

Purpose

A *spinal puncture* is performed to withdraw cerebrospinal fluid from the spinal canal for diagnosis or for therapeutic measures in certain diseases, as in cerebrospinal meningitis and hydrocephalus, to relieve pressure.

Equipment:

Sterile:

1. Four applicators.
2. Five cotton pledgets.
3. Three small gauze squares.
4. Two sterile towels.
5. Two spinal puncture needles with plunger, 3 inches long, 18-20 gauge.
6. Three medicine glasses, one for iodin, one for alcohol, one for novocain.
7. Hypodermic needle and syringe for local anesthetic.

Unsterile:

1. Small rubber.
2. Kidney basin.

3. Glass of 5 per cent lysol with forceps.
4. Glass (with cotton in the bottom) with 3 test-tubes marked on. 1-2-3.
5. Alcohol lamp.
6. Matches.
7. Flask with sterile novocain.
8. Collodion or adhesive.
9. Small blanket—large sheet.

A large active child may have to have a general anesthetic. There is little difficulty in restraining a small child. A sedative, as chloral hydrate by rectum, ½ hour before starting,

FIGURE 35. POSITION OF CHILD FOR SPINAL PUNCTURE

may be ordered. A local anesthetic, as novocain, makes it less painful. Remove the child's shirt and gown, place a small blanket over his shoulders, fold the bedclothes back over his hips. The temperature of the room should be 72° F.

Position of Child

Have him lie on his side with his back even with the side of the bed from which the doctor is to work. The nurse stands on the opposite side. Fold a sheet lengthwise in folds of 6 to 10 inches. Place the middle of this under the child'

body, bringing one end up around the back of his neck, and the other up under his knees with his arms caught under the sheet. Pull the two ends together with his body bent into the proper position, knees drawn up, shoulders and body forward, and back arched on a level with the edge of the bed. One nurse can easily hold a large child in this way.

If the doctor wishes to have the child's body in an upright position for the puncture, the nurse standing on the opposite side of the bed restrains him with the sheet in the same way, supporting him in the sitting position, back bowed and on a level with the edge of the bed from which the doctor works.

The site of the puncture is usually between the third and fourth or fourth and fifth lumbar vertebræ. Prepare a 4-inch area around this site and out over the crest of the ilium with iodin and alcohol and dry it. After the doctor scrubs his hands, with the forceps hand him a sterile towel to place under the patient's back, and one to place over his hips below the site of the puncture. The doctor sits on a level with the patient's back. Local anesthesia is used and the needle is inserted. Remove the cotton stopper from test-tube No. 1, flame the rim and hold it under the needle to collect the cerebrospinal fluid. Usually 1 to 2 fluid drams are withdrawn. Collect it in tubes Nos. 2 and 3 also. Seal the wound with collodion. **Site of Puncture**

12. Intraspinal Injection of Serum.

Intraspinal Injection of Serum

It may be necessary to inject serum intraspinally, as in tetanus or cerebrospinal meningitis. **Purpose** The equipment is the same as for spinal puncture with the addition of a 30 c.c. syringe for injecting the serum (which must be 100° F.), a 2-inch piece of rubber and a needle adapter, and a graduate to measure the fluid which is withdrawn. **Equipment** The amount of serum which is given is equal to the amount of fluid withdrawn. Gravity method may be used in place of the syringe. **Methods** The equipment for this consists of the regular spinal puncture outfit with a sterile glass funnel, rubber tubing, glass con-

Watch for Reaction

necting tube, and an adapter to fit the needle. Observe the child closely during the injection and afterwards for reaction.

13. Methods of Surgical Drainage.

Aspiration of Pleural Cavity

Purpose

A. *Aspiration of pleural cavity or thoracentesis* (*pleurocentesis*) is performed for (1) diagnostic and (2) therapeutic reasons.

Equipment

Equipment:

Sterile:

1. Six applicators.
2. Six cotton pledgets.
3. Two small gauze squares.
4. Two towels.
5. Twenty c.c. syringe.
6. Needles, 18-19 gauge, 3 inches long, (a) spinal puncture needles, or (b) venipuncture needles, 18-20 gauge, 3 inches long.
7. Medicine glass for iodin.
8. Medicine glass for alcohol.
9. Medicine glass for novocain.
10. Hypodermic syringe and needle.
11. (a) Syringe, rubber, clamp, adapter for diagnostic thoracentesis.
    (b) Y tube, rubbers, adapters, 2 clamps, syringe for therapeutic thoracentesis.

Unsterile:

1. Small rubber.
2. Kidney basin.
3. Bottle of 5 per cent solution with 2 pairs of handling forceps.
4. Graduate to measure fluid withdrawn.
5. Collodion or adhesive.
6. Glass with 2 sterile test tubes.
7. Alcohol lamp.
8. Matches.
9. Flask of 1 per cent novocain.
10. Small blanket.

Position of Child

If the child will remain quiet, the position is the same as for an adult; support him in the sitting position with his

back to the side of the bed. Remove the sleeve of his shirt and gown on the affected side. Bring the gown around to the opposite side and pin it. This makes a holder for the rubber sheet and sterile towel. Place the child's hand of the affected side on the opposite shoulder. Cover the shoulders

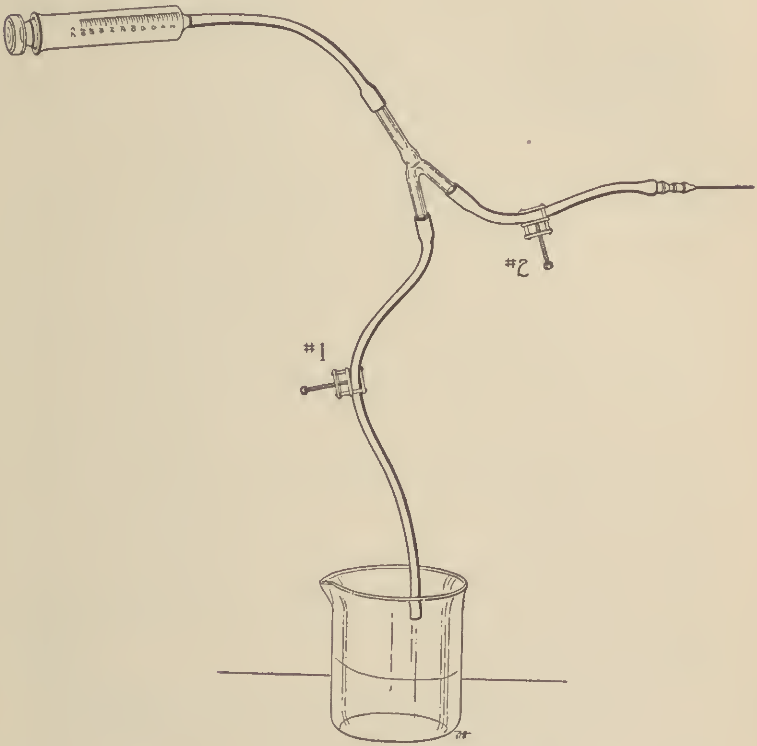


FIGURE 36. EQUIPMENT FOR THORACENTESIS

with a small blanket. Place the rubber in the holder which was made by pinning the gown. Prepare a 4-inch area around the site of the puncture, paint with iodin and alcohol and dry it. Place a sterile towel over the rubber sheet.

Diagnostic Thoracentesis

(1) When a thoracentesis is performed for diagnostic purposes only a small amount of fluid is withdrawn. Use equipment (a). The area of the puncture is anesthetized with novocain, using a hypodermic syringe and needle. The fluid is withdrawn into the syringe. Light the alcohol lamp. Remove the cotton stopper from one of the test-tubes, flame the rim of the tube before using it (fluid may be put in 2 test-tubes). Seal the wound with a collodion dressing. Watch the child carefully for reaction during the procedure.

Therapeutic Thoracentesis

(2) When a larger quantity of fluid is to be withdrawn for therapeutic. reasons several methods are available but the following is the common one. Use equipment (b). Close both clamp no. 1 and no. 2, insert the needle. Make negative pressure with the syringe. Open clamp no. 2 and withdraw the fluid from the chest. Close clamp no. 2; open clamp no. 1 and expel the fluid into the graduate. Close clamp no. 1, open clamp no. 2, and repeat. The child may struggle violently during this procedure so that he cannot be held in the desired position. In this case remove his clothes, restrain his arms and legs by the use of a folded sheet as for a spinal puncture, hold him by pulling the ends of the sheet together until he is in the desired position and support him thusly.

Aspiration of Pericardial Cavity

Purpose

B. *Pericardial effusion* may demand an *aspiration for removal of the fluid.* The equipment is the same as for the pleural aspiration.

Equipment

Needles, 19-19 gauge, 3 inches long with plunger, or
18-19 gauge, 3 inches long without plunger
20 c.c. syringe.

Position of Child

Position of the child: Place him on a head rest, restrain him as necessary; remove the sheet and gown. The usual area of the puncture is near the left margin of the sternum between the fourth and fifth ribs. Observe carefully the child's condition during the procedure.

Watch for Reaction

Aspiration of Abdominal Cavity

Purpose

C. *Abdominal paracentesis* is employed to withdraw fluid for diagnostic and therapeutic purposes.

Equipment: **Equipment**

Sterile:

1. Five Applicators.
2. Five cotton pledgets.
3. Four small gauze squares.
4. Sterile towel.
5. Sterile fluff.
6. Sterile pad.
7. Small scalpel.
8. Needles, 3 inches long, 18-19 gauge with plunger, or 3 inches long, 18-20 gauge without plunger.
9. Medicine glass for alcohol.
10. Medicine glass for iodin.
11. Medicine glass for novocain.
12. Hypodermic syringe with 2 needles.

Unsterile:

1. Small rubber sheet.
2. Dressing basin.
3. Bottle of 5 per cent lysol solution with 2 pairs of handling forceps.
4. Flask of 1 per cent novocain.
5. Collodion.
6. Glass (cotton in bottom) with 2 sterile test-tubes.
7. Alcohol lamp.
8. Matches.
9. Blanket and safety pins.
10. Adhesive.

See that the child's bladder is empty.

Position: **Position of Child**

1. The child may sit in a straight chair if possible.

2. He may sit on the side of his bed with his legs hanging over the edge, feet resting in a chair.

3. He may sit up against the pillows and head rest with legs extended.

If necessary, restrain him by pinning his arms and legs in a blanket. Fold the gown up over his abdomen; place the small rubber sheet over his lap and against the lower abdomen below the site of the puncture. Prepare the skin, a 4-inch area, with iodin and alcohol and dry it. Place

a sterile towel over the rubber sheet. The area to be punctured is anesthetized, an incision is made with a scalpel, and the needle is inserted. The basin is held ready to collect the fluid. A small amount of it is first collected in 1 or 2 sterile test-tubes (flame the rim before collecting it). Watch the patient's condition during the procedure. After the needle is withdrawn, clean the wound with a pledget. If it is dry, seal it with collodion; if it is oozing, dress it with a pad and adhesive.

Watch for Reaction

Paracentesis of Tympanic Membrane

Purpose

D. *Paracentesis of Tympanic Membrane—Myringotomy.* Myringotomy is performed to drain fluid or pus from the middle ear in otitis media.

Equipment

Equipment:

Sterile:

1. Ear curet.
2. Ear applicator.
3. Curved ear forceps.
4. Paracentesis knife.
5. Toothpick applicators.
6. Cotton pledgets.
7. Ear specula—various sizes.

Unsterile:

1. Kidney basin.
2. Handling forceps in jar of 5 per cent lysol solution.
3. Head mirror with indirect light or auriscope.
4. Blanket and pins.

Wrap the child in the blanket to restrain him; hold him as directed under "examination of the ear."

14. Von Pirquet Test for Tuberculosis.

Purpose

This test is usually done routinely on all children admitted to institutions as an aid in diagnosing tuberculosis. It is much more significant in childhood than in adult life. The younger the patient the more significant is a positive von Pirquet reaction.

Equipment

Equipment:

1. Alcohol in medicine glass.
2. Ether in medicine glass.

3. Cotton sponges in a jar.
4. Scarifier, tip sterilized in alcohol, wiped dry.
5. Koch's Old Tuberculin.
6. Handling forceps in glass of 5 per cent lysol solution.
7. Normal saline in a medicine glass.
8. Kidney basin.

The child's forearm is the most convenient place to apply the test. The skin is prepared with alcohol and ether and dried. Three scarifications are made about 1 inch apart. Koch's Old Tuberculin is dropped on 2 of the scarifications, normal salt solution on the third as a control. Hold the arm until the skin is dry. If there is a reaction, it usually occurs in 12 to 24 hours and consists of a reddened area around the inoculations and none around the control. **Site to Apply Test**

15. A **Mantoux Test** may also be employed to aid in making the diagnosis of tuberculosis. This consists of the introduction of a small amount of Koch's Old Tuberculin intradermally. **Mantoux Test** **Purpose**

Equipment: **Equipment**

Sterile:

1. Tuberculin syringe.
2. Alcohol in a medicine glass.
3. Ether in a medicine glass.
4. Fine hypodermic needle, 26-28 gauge.
5. Two sponges.

Unsterile:

1. Koch's Old Tuberculin.
2. Kidney basin.

Clean an area on the forearm with alcohol and ether and dry it.

16. **Phenolsulphonephthalein Test.** **Phenolsulphonephthalein Test**

Phenolsulphonephthalein is a dye which, when injected into body tissues, is excreted by the kidneys. By injecting a definite amount and estimating the amount excreted within **Purpose**

a certain time the kidney function is tested. Have the child empty his bladder immediately before the injection. The dye in salt solution is given as a hypodermic injection into the lumbar muscles. The child must drink at least 1 glass of water just after the injection so that he will be able to urinate at the desired time. Collect the urine in exactly 1 hour and 10 minutes and again in 2 hours and 10 minutes after the injection. Keep the urine specimens separate and mark clearly, indicating the time. Medications or liquids which have been previously ordered may be given during the test, but solid food is withheld until its completion.

To Collect Urine from Child

To Collect Urine from Infant

To collect urine from a small baby for a phenolsulphonephthalein test put a test-tube over his genitals (as for collecting a urine specimen) just after the injection of the dye and leave it on for 2 hours and 10 minutes, taking care that no urine leaks around the edges. Give him as much fluid as he will take. At the end of the time remove the test-tube and catheterize him for the remainder of the urine to complete the specimen. In this case it is not possible to keep the specimens separate.

17. Schick Test for Diphtheria.[7]

Schick Test

Purpose

When a case of diphtheria occurs, all persons who may have been exposed in any way should have a Schick test done to indicate whether or not they are susceptible. A minute amount of diphtheria toxin is injected intracutaneously. If a reaction occurs, it indicates absence of natural antitoxins and susceptibility to disease. If there is no reaction, it indicates the presence of natural antitoxin.

Equipment

Equipment:

Sterile:

1. Glass of alcohol.
2. Glass of ether.
3. Four cotton sponges.

[7] Holt, L. Emmett, M.D., "Diseases of Infancy and Childhood."

4. Tuberculin syringe.
5. Two needles, 28 gauge, $1\frac{1}{2}$ inches long.

Unsterile:

1. Kidney basin.
2. Jar of 5 per cent lysol solution with 2 pairs of handling forceps.
3. Toxin to be injected.

18. Vaccination.

Vaccination is the inoculation of man with virus of vaccinia or cow-pox to cause that disease, since it will produce a permanent or partial immunity to small-pox.[8] **Vaccination** **Purpose**

Equipment: **Equipment**

Sterile:

1. Scarifier (needle or scalpel).
2. Two flat toothpicks.
3. Two gauze squares.

Unsterile:

1. Rubber to blow virus from the tube.
2. Tube of virus.
3. Adhesive.

Site of vaccination: **Site of Vaccination**

Outer aspect of upper arm.
Outer aspect of upper third of calf of leg.

Several scratches at right angles to each other are made with a scarifier. They are made just deep enough to draw serum but no blood. The virus is blown from the tube to this area and is rubbed in with the flat end of a toothpick for a minute, then is allowed to dry. Cover with gauze and adhesive or a specially designed cap of isinglass.

19. To Determine the Coagulation Time of the Blood of the Newborn.[9]

To Determine Coagulation Time and Bleeding Time

(Employed at University Hospital, University of Minnesota.)

[8] Morrow, A. S., M.D., ''Diagnostic and Therapeutic Technique.''

[9] Rodda, F. C., M.D., ''Studies with a New Method for Determining the Coagulation Time of the Blood of the Newborn,'' *Am. J. Dis. Child.*, April, 1920.

Equipment

Equipment:

Sterile:

1. Glass for alcohol.
2. Glass for ether.
3. Six cotton sponges.
4. Spring lance or scalpel.

Unsterile:

1. Handling forceps in glass of 5 per cent lysol solution.
2. Two watch crystals, 1½ inches in diameter.
3. No. 6 lead shot.
4. Two squares of blotting paper.
5. Kidney basin.

The watch crystals and a shot are cleaned by sponging with alcohol and ether. The infant's heel is sponged with alcohol and ether. It is punctured with a lance to cause a free flow of blood without the slightest pressure. The second drop of blood is caught on one of the watch crystals containing the no. 6 shot. The second glass is inverted over it and the two are gently tilted every 30 seconds until the shot no longer rolls but is fixed in the clot. The average coagulation time is 7 minutes; if it is over 10 minutes, it indicates a prolonged coagulation time and an abnormal condition. The length of time the blood flows from the puncture determines the bleeding time. The normal is 2 to 5 minutes. The blotting paper is used to absorb the blood until bleeding stops.

Significance

Protein Sensitization Test

20. Protein Sensitization Test.

Purpose

In certain types of asthma, hay fever, and urticaria it has been shown that the organism is sensitized to proteins whether of food, pollens, or animal emanations. This phenomena is termed aniphylaxis. The identification of the offending protein is achieved by introducing a solution of the protein in hydroxid intracutaneously.

Equipment

Equipment:

1. Bottle of sodium hydroxid—1/10 normal solution.
2. Foreign proteins desired.

3. Glass of alcohol.
4. Glass of ether.
5. Two sterile medicine droppers.
6. Sterile toothpicks.
7. Sterile cotton pledgets.
8. Sterile cataract knife.
9. Paper bag for waste.

Procedure: **Procedure**

1. The skin, usually of the back, is cleaned with alcohol and ether. Superficial incisions of the skin are made with the cataract knife. Sodium hydroxid is placed on the incisions with the medicine dropper and the proteins are put on with the flat end of the toothpick and are mixed with the hydroxid.

2. Another method of doing this is to make the superficial skin incisions with a scarifier like the one used in doing the von Pirquet test.

3. Proteins may be introduced intracutaneously with a syringe and fine needle as in doing the Schick test.

CHAPTER XVII

NURSING TECHNIQUE IN GENERAL THERAPEUTIC PROCEDURES

A. Hydrotherapy is the science which deals with the treatment of disease by means of water.[1]

Internal Use of Water

1. *Internal use of water:*

The sick child in most cases needs large quantities of water:

By Mouth

a. *By mouth.* If he has been vomiting or has had excessive diarrhea he will quickly develop acidosis from lack of body fluids. Fever may also accompany this condition. When attempting to force the fluid intake give measured amounts at regular intervals.

Amounts Which May Be Given

> The child of 6 months can take 700 to 1500 c.c. in 24 hours.
> The child of 1 year can take 1500 to 2000 c.c. in 24 hours.
> The child of 2 years can take 1500 to 2500 c.c. in 24 hours.
> (Dr. F. C. Rodda, Minneapolis.)

How to Give to Infant and Child

The baby may be given water from a nursing bottle as he is given his feeding; if he is breast fed it may be easier to give him additional fluids with a spoon. The water given to a child under 1 year old should be boiled and cooled to 100° F. Ice water should never be given. An older child may drink water from a cup. Sometimes fluids may be given to a very sick patient with a rubber ear syringe; fill it with the fluid, insert the tip well into the child's mouth, press the bulb, slowly squeezing in the contents as he swallows; care must be taken not to choke him. The addition of saccharin (with a doctor's orders) to water is justifiable if it will increase the fluid intake. Use it in the proportions of ⅛ grain to 8 ounces of water; dissolve in a little hot water first, then add the remainder. If a child's condition will permit, the addition of fruit juices, as orange juice,

[1] Parker, L. A., R.N., "Materia Medica and Therapeutics."

will often be helpful in forcing fluid; a small amount of sugar may be added to make it palatable; the addition of sugar may be indicated in some instances, as in acidosis. If in spite of all efforts the child still refuses to take fluids they are usually ordered by gavage, i.e., by the introduction of the tube through the nose or the mouth. (See description of gavage, Chapter XIX.) In this way desired quantities of fluid may be given at stated intervals. Sometimes fluids by mouth cannot be retained even when gavaged, as in the case of pyloric stenosis. In such cases fluids may be given:

By Rectum

b. *By rectum* (1) either in small quantities injected at regular intervals or (2) by continuous Murphy drip method. (See directions under enemata, Chapter XIX.) Glucose solution 5 per cent or normal salt solution are frequently used. (3) Colon flush may be employed to relieve nervous irritability and to reduce the temperature. (Described under enemata, Chapter XIX.)

Under the Skin

c. Fluids, as normal saline, are also given *under the skin*. (See hypodermoclysis, Chapter XVI.)

d. Fluids may be given *intravenously*. (See description, Chapter XVI.)

Into Peritoneal Cavity

e. They may be given directly into the *peritoneal cavity*. (See description, Chapter XVI.)

External Use of Water

2. *External use of water* in the treatment of disease:

The therapeutic action of the external use of water depends largely on the temperature of the water; it must be sufficiently hot or cold to produce some effect, but we must constantly bear in mind that in treating the child extreme degrees of temperature are to be avoided. Extreme heat may cause severe depression, and extreme cold may produce shock.[2]

Effect of Cold

a. *Cold* applied to the surface of the body causes contraction of the blood vessels followed by a reaction which dilates them, and a general stimulation and tonic action result. (See note 2.)

[2] Sheffield, Herman B., M.D., ''Diseases of Children.''

Effect of Heat

b. *Heat* applied to the surface of the body dilates the superficial blood vessels, causing diaphoresis, and increased elimination, thus congestion is relieved. The body temperature is at first increased and later decreased. (See note 2.)

Temperatures

Temperatures[3]	*Effect*
Cold, 40°-60° F.	Overstimulation followed by fatigue or even collapse. Hemostatic.
Cool, 65°-75° F. Tepid, 85°-95° F.	Stimulation.
Warm, 95°-100° F.	Sedative.
Hot, 100°-110° F.	Stimulation.
Very hot, 110°-120° F.	Hemostatic.

Use of Cold

a. *Use of cold:*

Cold Pack

Purpose

(1) *Cold pack* is employed to relieve nervous irritability, to produce sleep, and to lower an elevated temperature.

Equipment

Equipment:

- Hot water bottle (and cover) 115° F.
- Ice-cap with cover.
- Two blankets.
- Sheet large enough to envelop child.
- Tub of water 100° F.
- Rubber sheet.
- Bath thermometer.
- Pan of ice in large pieces.
- Bath towel.
- Face towel.

Procedure

Fold the bedclothes to the foot of the bed, at the same time replacing them with a blanket; place the rubber sheet covered with a blanket under the child; remove all his clothes but his diaper; place the hot water bottle at his feet and the ice cap at his head; apply friction to the entire body by rubbing for two or three minutes; the sheet is wrung from water 100° F. and placed under the child crosswise with the ends

[3] Hinsdale, Guy, M.D., "Hydrotherapy."

brought up over his body and under his arms to completely envelop him, and in such a way that one surface of the body does not come in contact with another; fold back the upper blanket and rub ice upon the outer surface of the sheet, first in front, including the arms, then back and legs, so that his entire body is included. (Hold the piece of ice in a towel while doing this.) The upper blanket is again put over the child and he is left wrapped in the sheet about one hour if his condition will permit. Watch him for cyanosis and take his pulse frequently; repeat the ice rub once during the interval. At the end of the hour remove the sheet; dry his body; remove the blankets and rubber. If the child seems cold leave the hot water bottle at his feet. Take his temperature, pulse and respirations in ½ hour. (See note 2.) If he is asleep do not awaken him for the temperature but take and record the pulse and respirations.[4], [5], [6]

Watch for Reaction

(2) *Sponge bath* (University Hospital Routine, University of Minnesota) is given to improve the circulation and respirations, to increase elimination, to relieve restlessness, to make the patient more comfortable, and to reduce an elevation of temperature.

Sponge Bath

Purpose

Equipment:

Equipment

- Large rubber sheet.
- Small cotton sheet.
- Hot water bottle (with cover) 115° F.
- Ice-cap with cover.
- Bath thermometer.
- Bath blanket.
- Gauze sponge.
- Bath towel.
- Basin of water, unless otherwise ordered 90° F., at first, then gradually lowered to 80° F.
- Pitcher of cracked ice and water.

Procedure

Fold the upper bedclothes to the foot of the bed, replacing them with the blanket; fold the rubber and sheet together in

[4] Hess, Julius H., M.D., "Principles and Practice of Infant Feeding."
[5] Holt, L. Emmett, M.D., "Diseases of Infancy and Childhood."
[6] Dunn, Charles H., M.D., "Pediatrics."

folds lengthwise and slip them under the child; remove all his clothes but his diaper; place the hot water bag at his feet and the ice-bag at his head. Apply friction to the entire body for 2 or 3 minutes by rubbing. Fold the bath blanket to the center of the trunk exposing ½ of the body, then proceed to sponge with one hand, follow with the other, using long even strokes. Dip the sponge in the basin of water, leaving enough on it to run down over the body after the sponging. Begin at the hair line of the neck and sponge down over the shoulder and outer arm, keeping the arm separated from the body; turn the sponge in the hand, begin at the hair line and sponge over the shoulder and the inner arm. Dip the sponge; sponge over the chest and trunk, outer leg and inner leg to the foot. Continue, dipping the sponge every second stroke until the exposed surface of the body has been covered. At intervals mop the water from the bed with the sponge. Keep the water in the basin at the desired temperature.

Watch for Reaction

Note the pulse frequently and watch the patient for cyanosis. Continue sponging for 5 minutes. Fold the bath blanket over the sponged surface and expose the other half of the body. Proceed in the same way, sponging for 5 minutes if the child's condition will allow it. Cover him with the blanket and turn him on his side to expose his back; sponge it for 5 minutes, beginning at the neck and working down to the feet. To remove the patient from the bath, mop the water from the bed; roll the rubber and sheet close to the back; dry the back and turn him on the dry bed, removing the rubber and sheet. Dry his entire body, put his clothes on, remove the blanket and fold up the bedclothes. Take the temperature, pulse, and respirations in ½ hour if he is awake; if not, take only pulse and respirations and record them.

Alcohol Sponge

Purpose

(3) *Alcohol sponge* is given for the same purpose as the sponge bath. (University Hospital Routine, University of Minnesota).

Equipment: **Equipment**

Two bath blankets.
Ice-cap with cover.
Hot water bottle (with cover) 115° F.
Gauze sponge.
One pint 25 per cent alcohol.
One bath towel.

Procedure

Fan fold the upper bedclothing to the foot of the bed, covering the child with the bath blanket; slip the other blanket under him; remove all his clothes but the diaper; unpin that and leave it under him; place the ice-cap at his head and the hot water bottle at his feet. Apply friction to the body by rubbing for 2 or 3 minutes. Expose ½ of the body and sponge as in the sponge bath. Squeeze the solution from the sponge so that none will drip on the bed; keep the arm separated from the body while sponging. Continue 10 to 15 minutes as ordered, or as the child's condition will permit. Dry him; dress him; fold up the bedclothes and remove the blankets. Take his temperature, pulse and respirations in ½ hour. If he is asleep take only the pulse and respirations and record them.

Watch for Reaction

Cold Wet Applications

Purpose

(4) *Cold wet applications* are used for all forms of local irritation, to relieve pain, swelling, heat, or redness; they may be put on the throat, as in tonsillitis or croup, or to the chest to relieve nervous irritability, and to reduce an elevated temperature.

Cold Wet Application to Neck

(a) *Cold wet application to the neck* is made of light weight cotton material; use several thicknesses and cut it to fit the child; wring it from water 90° to 80° F. (or as ordered); cover this with a piece of old flannel and pin it in place with safety pins. Protect the bed and pillow with a rubber sheet and rubber slip.

Cold Wet Application to Chest

(b) *Cold wet application to the chest* is also made of some light weight cotton material cut into a sleeveless jacket to fit the chest; cut another one from old flannel about 2 inches longer all around. Put a rubber and a pad under the

child's neck and shoulders to protect the bed. Wring the cotton jacket from water 90° to 80° F. (or as ordered); fit it inside the flannel one, slipping both under his back and over his chest; pin on the shoulders and under the arm. Put his night dress on and leave the application on his chest, changing it every ½ to 1 hour, or as necessary to keep it constantly moist.

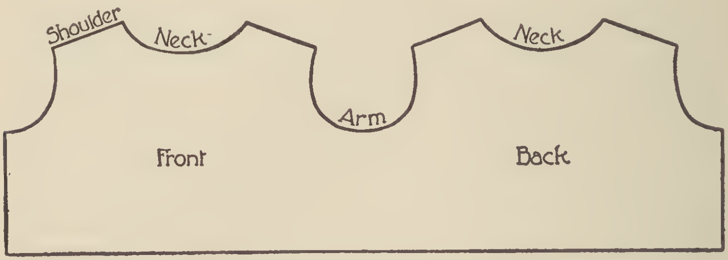


FIGURE 37. JACKET FOR COLD APPLICATION TO THE CHEST

Use of Heat

b. *Use of heat:*

Hot Pack Purpose

(1) *Hot pack* is used to produce diaphoresis.

Equipment

Equipment (University Hospital Routine, University of Minnesota):

Three large woolen blankets.
One large rubber sheet.
One small rubber sheet.
Two cotton bath blankets (1 for a small child).
One bath towel.
One face towel.
Bath tub with water 100° to 110° F.
Bath thermometer.
Ice-cap with cover.
Hot water bottle with cover (115° F.).

Procedure

Put the large rubber sheet between 2 of the woolen blankets and warm them with the third woolen blanket in the blanket warmer; fan fold back the upper bedclothes, replacing them with the third woolen blanket; put the rubber sheet (between the two woolen blankets) under the child; remove all his clothes but the diaper; wring the two cotton blankets from the

tub of water, 100° F.-110° F., and place them under him, one lengthwise and one crosswise of the bed; fold them around him to completely envelop his body and in such a way that no two surfaces of the body are in contact; put a hot water bottle at his feet and an ice-cap at his head. Tuck the dry blanket over him down well over his sides and fold the blankets and rubber under him up over his body; put a small rubber sheet over all and tuck it in. Draw the bedclothes up for greater warmth. Take the child's pulse at the temple every 15 minutes. Do not leave him alone in the pack; give him hot and cold drinks during the procedure, as much as he will take (unless his liquids are restricted). Leave him in the pack 20 minutes after perspiration has started if his condition will permit. Remove the wet blankets and rubber sheet, leaving him between dry woolen blankets. After ½ hour dry his body, give him an alcohol rub, and remove the blankets. **Watch for Reaction**

(2) *Mustard bath* is given in cases of sudden shock, heart failure, collapse, convulsions, or great prostration from any cause. **Mustard Bath Purpose**

Equipment: **Equipment**

- Two bath blankets.
- One bath towel.
- One face towel.
- One hot water bottle (115° F.) with cover.
- One ice-cap with cover.
- Bath thermometer.
- Tub large enough for the child—a foot tub is used for the small baby.
- Mustard—use in proportions of 1 tablespoonful to a gallon of water.

First mix all the mustard with a little cool water to make a smooth paste, then add the remainder of the water at a temperature of 100° F., gradually increasing to 105° F. The duration of the bath is 10 minutes; it may be necessary to repeat it in 1 hour. Remove the child from the tub, place him in bath blankets, dry his body, dress him, and leave him with **Procedure**

the ice-cap at his head and the hot water bottle at his feet.

Mustard Pack

Purpose

(3) *Mustard pack* is used for the same conditions as the mustard bath; it is less efficient but less disturbing to the patient.

Equipment

Equipment:

Large rubber sheet.
Two bath blankets.
Large sheet.
Tub of water 105° F.
Bath thermometer.
Ice-cap with cover.
Hot water bottle (115° F.) with cover.
Mustard—use 1 tablespoonful to a gallon of water.

Procedure

Fan fold the upper bedclothes to the foot of the bed, replacing them with a blanket; place the rubber sheet and blanket under the child; remove all his clothes but the diaper; put the hot water bottle at his feet and the ice-bag at his head. Wring the sheet from the tub of mustard water; place it under the child crosswise of the bed and completely envelop his body with it; bring the under blanket and rubber up over him and tuck the upper blanket down around his sides; leave him in the pack 15 to 30 minutes, or until there is a notable redness of the skin. Remove him, dry and dress him, and leave him with the hot water bottle at his feet and the ice-cap at his head.

Hot Wet Applications

Purpose

(4) *Hot wet applications* are used to promote local cellular activity and to aid drainage.

Equipment

Equipment:

Several thicknesses of woolen material as old blanket.
Oiled silk or muslin large enough to cover the application.
Binder or bandage to secure the application.
Safety pins.
Stupe wringer and handles.
Two pairs of handling forceps in glass of 5 per cent lysol solution.
Sterile pad for dressing over an open wound.
Kidney basin.
Round basin.

Procedure Use several thicknesses of old woolen material (as old blanket) large enough to completely cover the area; fold it in the canvas part of the stupe wringer in the basin and bring to a boil over a flame; use the wringer handles to wring the application dry; take it to the bedside on a tray with the rest of the equipment. Remove the application from the canvas with the forceps and place it over the desired area. If there is an open wound, first cover it with a sterile pad. Cover all with a dry piece of flannel and oiled silk, holding them in place with a binder or bandage as necessary. Change the application every 1 or 2 hours, depending on its size; it must be changed often enough to keep it constantly moist and warm.

Hot Air Bath

Purpose (5) *Hot air bath* is given as a diaphoretic and to increase elimination, i.e., as in nephritis with impending uremia.

Equipment

Equipment:

- Ice-cap with cover.
- Hot water bottle (115° F.) with cover.
- Four or 5 blankets.
- Two large rubber sheets.
- Bed cradle long and wide enough to completely cover the child's body.
- Bath thermometer with a long string tied to the handle.
- Hot-air stove and elbow pipe covered with asbestos.
- Bunsen burner or alcohol lamp.
- Drinks.
- Alcohol for rub after bath.

Procedure Cover the child with a blanket; remove the upper bedclothes, folding and placing them in a chair; leave one pillow under his head; put one large rubber sheet and a blanket under him; remove all his clothes but the diaper. If he is very restless, delirious, or active enough to interfere with the procedure, restrain him by wrapping and pinning the blanket which is under him tightly around him and use the one over him to cover the cradle; otherwise leave him between the blankets, put the ice-cap at his head and the hot water bottle at his feet; place the cradle over his body; put the bath

thermometer under it and over the child's body leaving the string outside to facilitate the removal when it is necessary to read it. Arrange the stove on the support at the foot of the bed and run the pipe covered with asbestos 3 or 4 inches under the cradle; tie it to the cradle so that it is 4 inches at least above the child's feet. Draw the ends of the rubber and blanket which are under him up over the sides of the cradle, and under the blankets which are put over it; use two to four blankets over it, as necessary to produce the desired temperature; tuck them in well around the child's neck and shoulders, around the pipe and under the mattress at the foot of the bed, and under the cradle at the sides. Cover all with a second large rubber sheet, tucking it in over the blankets in the same way. Put the lamp or burner in the stove and light it. Give the child as much fluid as he will take, unless restricted. Watch his pulse, taking it frequently at the temporal artery. Do not leave him alone in the hot air bath. Unless otherwise ordered the temperature of the bath is 110° F. to 115° F.; leave him in it 15 to 20 minutes after the desired temperature has been reached, unless his condition indicates immediate removal. After removal leave him in the blankets for an hour; wrap the one directly under him around him and leave the ones which covered the cradle over him. Make up the bed. At the end of an hour wipe his body dry; give him a vigorous alcohol rub; dress and leave him between dry blankets, or at least with one directly over him. He should be carefully protected from exposure or draughts.

Watch for Reaction

B. Heliotherapy.

History

As early as 490 B.C. the beneficial effects of the sun's rays were recognized by the Greeks, but not until recently have they been utilized as definite therapeutic agents. Shortly before 1800 sun treatment was practiced by the French, and through the nineteenth century was employed by several eminent physicians. In recent years, Dr. Rollier of Leysin, Switzerland, has been the greatest exponent of heliotherapy.

In dealing with surgical tuberculosis he saw that in spite of great skill and excellent technique, poor results were obtained by the surgeons. Dr. Rollier realized that these infections must be treated not as purely local lesions, but as general constitutional diseases. The J. N. Adam Memorial Hospital of Perrysburg, New York, a municipal institution of the City of Buffalo, was the first hospital built for this purpose in the United States. Dr. John Pryor adapted Dr. Rollier's system of solar radiation to the needs of this hospital and wonderful results have been obtained.

System and a careful application of it are essential. Solar rays, when applied to the skin, must be used as cautiously as any other therapeutic agent; an overdose can be very definitely harmful. The best results will be obtained only by strict regulation of the process together with careful observation of the patient.

Process of Insolation

This treatment can be carried out all the year around and in almost all altitudes and climates. Institutions adopting this method of treatment should have wide sheltered terraces, where the beds may be rolled out into the sunshine.

Therapeutic Value

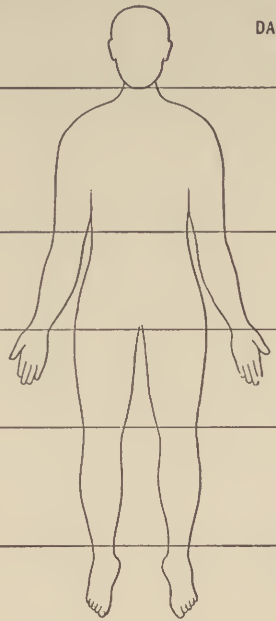
Heliotherapy is valuable in all cases where resistance is below normal, including tuberculosis, anemia, rickets, peritonitis, undernutrition, and during convalescence from acute infectious diseases. It is with tuberculosis that the most work has been done. Of equal interest and importance is the work of Hess and others with rickets.[7] This is the commonest nutritional disorder among infants, yet little has been known about it. Some have believed the main cause to be dietetic, while others held that it resulted from faulty hygiene. Its occurrence during winter and spring and disappearance during summer called attention to the possible effects of direct sunlight. Hess exposed babies to the direct rays of the sun for from fifteen minutes to one hour daily and found that they not only improved in general vigor and nutrition but also

[7] Hess, A. F., M.D., *Am. J. Pub. Health.*, Feb., 1922.

that without exception the signs of rickets rapidly disappeared. While cod-liver oil is a specific for this disorder and should be used, we find from this work that sunlight is an extremely important prophylactic agent.

Technique The patient should never be subjected to sudden insolation, but should become accustomed gradually to fresh air and sunshine. The first day or two have him sleep with open windows. Then in two or three days wheel his bed out on the porch for an hour, increasing this period until he can stay out-of-doors all day. In a week or ten days direct exposure may be started. Sun baths should not be given later than one-half hour before the noon meal, and not earlier than two hours after eating. During insolation the eyes should be protected by a folded cloth, colored glasses, or an umbrella. The patient should rest in bed, warmly covered except for the exposed area. The feet are insolated first, and the rest of the body gradually included, as clearly shown in the diagram. Sinuses and ulcers are protected by wire screening, which permits free circulation of air and admission of sun rays. When the discharge is profuse, a light gauze dressing may be changed frequently. These lesions are the last to receive direct exposure. During the treatment, close watch must be kept of the temperature, pulse, urine, and blood. The exposure should not be long enough to cause dermatitis, rise in temperature, headache, nausea, or other constitutional symptoms. Feeble patients with high temperatures should have shorter insolation than that indicated on the diagram. It is most important that no breeze strike the body. Screens or wind-breaks may be used for protection. As soon as a patient seems chilly, he should immediately be wheeled back into a warm room. In the summer the sun has a fatiguing and depressing effect during the middle of the day, and must be avoided. When the weather is warm, the children wear only a loin cloth all day, whether eating or playing out-of-doors. During the winter months, when the sun's rays are weak, the children are allowed to exercise in the snow for an hour

DR. ROLLIERS SCHEMATIC DIAGRAM OF INSOLATION



DAYS	1st	2nd	3rd	4th	5th	6th	7th	8th	9tn	10th	
					5 Min.	10 Min.	15 Min.	20 Min.	25 Min.	30 Min.	From the 10th to the 15th day, increase according to the same scale.
				5 Min.	10 Min.	15 Min.	20 Min.	25 Min.	30 Min.	35 Min.	From the 15th day, all the previously exposed portions of the body should receive the same amount of insolation as the longest exposed part,—increasing the time 5 minutes daily, till a bath of from 3 to 4 hours is taken.
			5 Min.	10 Min.	15 Min.	20 Min.	25 Min.	30 Min.	35 Min.	40 Min.	
		5 Min.	10 Min.	15 Min.	20 Min.	25 Min.	30 Min.	35 Min.	40 Min.	45 Min.	
	5 Min.	10 Min.	15 Min.	20 Min.	25 Min.	30 Min.	35 Min.	40 Min.	45 Min.	50 Min.	

THE PROGRESSION BY WHICH THE PATIENT IS EXPOSED TO THE SUN

FIGURE 38.

or two on pleasant days. Socks, shoes, and a loin cloth are the only clothes worn at this time. Recumbent patients who have completed their exposure are given four or five hours of insolation daily, when the weather permits. On cloudy days air baths may be given for an hour. Although not an adequate substitute for insolation, air exposure is beneficial to the patient.

Solar Rays

The beneficial effects of solar radiation are attained mainly by the short length waves, of which the ultra-violet is perhaps the most valuable. Special lenses are sometimes used to enhance these. Artificial light produced by special lamps has proved useful.[8,9] The quartz lamp and carbon arc lamp have both been used with excellent results in rickets.[10] In tuberculosis the results are inferior, but still very much worth while in the absence of direct sunlight. Window glass, on the other hand, is impermeable to some rays and patients receiving treatment through it enjoy only about one-fourth of the benefit of fresh air exposure.

Effects upon the Body

Insolation has three distinct effects upon the skin: it causes a latent hyperemia, a pigmentation, and a thickening of the epidermis. The hyperemia promotes absorption of the rays; the pigmentation increases their penetrability so that they are more completely absorbed; and the thickened epidermis affords the body increased protection against abrasions and bacterial invasion. Apart from the effects on the skin, there have been shown to be distinct changes in the whole metabolism. The cellular elements of the blood are influenced, as is the phosphorous content of the blood serum.

Pain usually disappears within ten days after treatment is begun, fever drops, chills cease, appetite returns, weight and strength are regained, and the condition of the blood improves. Hemoglobin and red cells increase, while leuco-

[8] Lasch, W., and Wertheimer, W., "Effect of Artificial Heliotherapy on Metabolism," *Monatschr. f. Kinderh.*, Nov., 1921.

[9] Hess and Unger. *Journ. Amer. Med. Assn.*, May 27, 1922.

[10] Kramer, Casparis and Howland. *Am. J. Dis. Child.*, Sept., 1922.

cytosis, if present, decreases. In peritonitis with effusion, the fluid slowly but steadily absorbs. In surgical tuberculosis sequestra are painlessly discharged, the sinuses have a profuse discharge followed by sloughing and the formation of healthy granulation tissue, and there is abundant recalcification. If treatment must be interrupted at any time, it should be resumed at a stage somewhat earlier than that at which it was discontinued. After exposure a gentle rub with spirits of camphor will harden the skin, give it a velvety texture, and refresh the patient. This application is not essential and may be omitted when the expense is too great. For a sensitive skin an oil rub may precede the sun bath. As pigment increases, the skin becomes first tanned, then bronzed, and finally a deep chocolate color. The texture is velvety and there is great resistance to bacterial infection. These patients are not subject to the usual winter infections of the respiratory tract, including influenza. The degree of pigmentation is in direct proportion to the favorable progress of the cure. Dr. Rollier considers this an index to prognosis.

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CHAPTER XVIII

NURSING TECHNIQUE IN GENERAL THERAPEUTIC PROCEDURES
(*Continued*)

Use of Drugs for Children

C. Drugs are not used as much in the treatment of disease in children as in adults. They are given only when the child's condition presents some clear and definite indication for their use. Dr. Jacobi has said that most conditions in childhood tend to right themselves without any medication.[1] A large proportion of the acute illnesses of infancy and childhood are due to disturbances of the gastro-intestinal tract; any disease tends to manifest itself by gastro-intestinal symptoms. Since the use of drugs also tends to derange digestion, it is important not to allow their continued use to still further interfere with this function.[2]

Dosage

1. *The relative dosage* is another difficulty in administering drugs to children. The child cannot be treated as a miniature adult and cannot be given a fraction of the adult dose. When calculating the proper dose, it is necessary to consider the peculiarities of infants and children, and also the fact that certain drugs are well tolerated by them while others are not. There are various formulæ to calculate the proper dose; these are based on weight or age, or weight and age. Clark's rule gives the most exact results. Multiply the adult dose by the weight of the child (in pounds) and divide by 150 (the weight of the average adult).

Clark's Rule

[1] Holt, L. Emmett, M.D., "Diseases of Infancy and Childhood."

[2] Helmholz, Henry F., M.D., "The Use of Drugs in Infancy and Childhood." *Journ. Amer. Med. Assn.*, Oct. 8, 1921.

2. *Methods of giving drugs:* **Methods of Giving**
   - a. By mouth.
     - By gavage—inserting the tube through the (a) nose or (b) mouth.
   - b. By rectum.
   - c. Intravenously.
   - d. Intraspinally.
   - e. Intramuscularly.
   - f. Subcutaneously.
   - g. By inunction.
   - h. By inhalation.

By Mouth

a. *By mouth:* Powders, capsules, and pills have a limited use except for the older child. As a general thing drugs should be given in as simple a form as possible, preferably in solution. If it can be avoided a child should not be forced to take any particularly nauseous or bitter medicine; it should be made as palatable as possible; follow it always with a drink of water and with orange juice if possible.

Sweet syrups and elixirs which are sometimes used to disguise disagreeable tastes are also nauseous and they quickly upset digestion. The small baby, as a rule, will take almost any medicine. The older child who is well trained if tactfully approached and reasoned with will offer little difficulty; explain to him the necessity for it, appeal to his better instincts and sense of honor by asking his coöperation; do not antagonize him from the first by using force or by expecting unreasonable things of him. Do not tell him his medicine is "good" if you know very well that it is distasteful. The so-called "spoiled" child, who has always listened to meaningless threats or bribes and who has been constantly permitted to have his own way, will present many difficulties. A child can always be made to take any medicine by using restraints and force, but this should be done only as a last resort when other methods have been tried and have failed. If it has to be done pin his hands in a blanket, place him on his back in bed, and put the spoon containing the medicine on the back of his tongue and hold it there, allowing the medicine to run

in until swallowing takes place; in this way he cannot regurgitate but has to swallow. Medicine may also be given by gavage, introducing the tube through the mouth or nose. (See technique for procedures, Chapter XIX.) Suggestions for giving some of the common medications:

Calcium Lactate For the small baby, whenever possible, put the medicine with his milk; as for example, (1) *calcium lactate* or *calcium chlorid* (given for spasmophilia) are very bitter, but mixed with the feeding are usually well taken. Avoid giving particularly nauseous medicines near a meal.

Cod Liver Oil (2) *Cod liver oil* may cause digestive disturbances when given over a long period of time. It should be given halfway between feedings or between meals, and if mixed with orange juice it is much more palatable. A cod liver oil emulsion can be given without producing nausea. Special glasses or spoons should be set aside for giving it, since it causes them to smell and taste.

Castor Oil (3) *Castor oil* is made more palatable if given ice cold and mixed with orange or lemon juice. To prepare: squeeze 2 or 3 ounces of orange juice in a glass; take it with the measured oil and ¼ dram of sodium bicarbonate to the bedside; mix the three together, stir, and give while it is effervescing; follow with a drink of orange juice or let the patient hold a piece of ice in his mouth. A thin chocolate syrup will disguise the taste of many disagreeable medicines if the child's condition will warrant its use; it is particularly valuable when giving quinin or powdered animal charcoal. A little square of milk chocolate may be given after a medication.

Cascara Sagrada (4) *Cascara sagrada* is best taken in the form of aromatic fluid extract.

Digitalis (5) When giving *digitalis* drop it on some sugar in a spoon.

Atropin Sulphate (6) *Atropin sulphate* is a drug frequently given very young children (see pyloric stenosis). The nurse who does pediatric work must know the toxic symptoms of this drug. They are:[3]

[3] Bloomgärten, A. S., M.D., "Materia Medica for Nurses."

1. Dryness of the mouth and throat.
2. Excessive thirst.
3. Difficulty in swallowing.
4. Hoarseness.
5. Flushed, dry skin, especially on face and neck.
6. Very rapid pulse and breathing.
7. Pupils widely dilated.

When starting to give atropin 1 minim of a 1-1000 solution is usually ordered several times a day, and increased 1 minim every day or every other day until signs of atropinism appear. The nurse must watch the patient closely and must be able to distinguish these signs at once. In the small child dilatation of the pupils and flushed skin, especially of the face and neck, are the most characteristic early symptoms.

By Rectum

Chloral Hydrate

b. *By rectum:* Certain drugs, such as *chloral hydrate,* are very irritating to the stomach and are successfully given by the rectum. (See directions for giving a small enema, Chapter XIX.)

Intravenously

c. *Intravenously:* The intravenous method of giving medications, as antitetanic serum or diphtheria antitoxin, has already been discussed. (See intravenous infusion of fluids, Chapter XVI.)

Intraspinally

d. *Intraspinally:* The intraspinal method has been discussed; cerebrospinal meningitis serum may be given this way. (See intraspinal injection, Chapter XVI.)

Hypodermically

e. *Hypodermically or subcutaneously:* Many drugs, as morphin sulphate or atropin sulphate, are given in this way.

Hypodermic tray should contain:

Equipment

Equipment:

1. Flask of sterile distilled water.
2. Alcohol lamp.
3. Matches.
4. Forceps.
5. Jar of sterile cotton pledgets.
6. Paper bag for waste.
7. Bottle of alcohol 70 per cent.
8. Tablespoon in which to boil the needle.

9. One c.c. hypodermic syringe.
10. Needles ½ to ¾ inches long, 26-28 gauge.
11. Medicine glass of alcohol in which to sterilize syringe.
12. Drug in tablet form.
13. Rubber bulb.

Remove the wire from the needle, put it on the syringe and test for leakage, replace the wire, wrap the needle lightly in cotton, and sterilize by boiling in water in the large spoon over the alcohol flame for 1 minute. Flame the forceps and with them place the needle on a sterile cotton pledget. Sterilize the syringe by drawing alcohol up into it and expelling it several times; let it soak in the glass of alcohol while the needle is boiling; then rinse it by drawing up sterile water from the spoon and expelling it. Then draw up a quantity sufficient to dissolve and dilute the tablet. Expel it into the empty spoon; pick up the tablet with the sterile forceps and put it in the measured water in the spoon; dissolve it by stirring with the tip of the syringe; draw it up into the syringe; pick up the needle with the sterile forceps, remove the wire and attach it to the syringe; expel the air by holding the syringe with the needle pointing up and force out 1 or 2 drops of the solution. Enfold the needle in an alcohol sponge and with a second alcohol sponge carry it to the patient. Replace the drug and lock the medicine closet before leaving. Place the syringe in the sponge on the bedside table while preparing the patient. If he struggles while the hypodermic is being given, restrain him by pinning a blanket around him. It may be given in any fleshy part of the body and not over any bony portion. The usual sites are:

Sites for Injection

1. Outer aspect of upper arm.
2. Inner aspect of thigh.
3. Calf of leg.
4. Buttocks.

Cleanse the area well by rubbing with an alcohol sponge. Raise and hold between the thumb and forefinger of the left hand a fold of tissue around the area of injection; hold the

syringe in the right hand and quickly insert the needle; slightly withdraw it, then inject the fluid by making pressure on the piston of the syringe with the thumb; quickly withdraw the needle; knead the area gently with a sponge in order to aid in the absorption of the drug. If the drug is in solution instead of in tablet form, prepare the needle and the syringe in the same way, rinse the syringe, attach the needle, remove the cork from the bottle, lower the needle into it and draw the desired amount of the drug up into the syringe. Give as before.

Intra-muscularly

f. *Intramuscularly:* For intramuscular injection the equipment and procedure are the same as for subcutaneous injection except for the needle, which is 24 to 26 gauge, 1 to 1½ inches long and the drug is given deeper by inserting the needle vertically into the muscle; the gluteal region is preferable. Press over the puncture with a sponge and massage it gently to aid the absorption of the drug. **Needle**

A special syringe and needle should be kept separate for giving camphorated oil; the needle should screw on the syringe and it should be 22 to 24 gauge.

Care of articles used: Clean the syringe and needle by drawing up alcohol and expelling it. Leave the syringe with the plunger out and absolutely dry. Dry the needle by blowing out all moisture with a rubber bulb. Dry the wire; dip it in liquid petroleum and replace it in the needle. Leave the tray in order and ready for immediate use.

Inunction

Mercury

g. *Inunction:* Drugs, as *mercury,* are often given a child by inunction. Wash the site of the inunction with soap and water to soften the skin.[4] The nurse puts a rubber glove on her right hand, takes the desired amount of ointment in her fingers, and rubs it all into the child, using the tips of her fingers and the heel of her hand with a rotary motion. The site for inunction is changed daily in the following routine:

Sites for Routine Inunction

[4] Ramsey, W. R., M.D., and Groebner, O. A., M.D., "Further Progress in the Study of Relative Efficiency of Different Mercurial Preparations," *Am. J. Dis. Child.*, Sept., 1920.

1st day, inner right arm.
2d day, inner left arm.
3d day, inner right thigh.
4th day, inner left thigh.
5th day, chest.
6th day, back.
7th day, rest.

After use wash the glove with soap and water, then rinse, dry, and remove it, using it for this purpose daily. Sometimes, in the case of a baby, instead of rubbing the mercury ointment in with the hand, the desired amount is ordered to be put under the adbominal binder and is allowed to rub itself in as the child moves about.

Inhalation For Child

h. *Inhalation:* (1) Inhalations, as of steam or benzoin, may be given to the child as to the adult.

Method 1:

Equipment:

1. Pitcher of boiling water containing the desired drug.
2. Bath towel.
3. Paper bag large enough to go over the pitcher.

Cut a hole (large enough for the patient to put his nose and mouth through) in the bottom of the bag and put it over the pitcher with the bottom up. If the child can sit up, hold the pitcher in front of him; have him hold his nose and mouth over the hole in the bottom of the bag to inhale the steam; cover his head and the pitcher with a large bath towel or blanket to prevent the escape of the steam. The child must not be left alone for an inhalation because he may burn himself. Continue it for 10 to 20 minutes and repeat every 2 or 3 hours as ordered. If he cannot sit up, place the pitcher on a chair at the side of his crib; have him lie on the edge of his bed on his side; adjust the paper bag over the pitcher (with the bottom up) so that it will convey the steam from the pitcher to the child. Throw a large bath towel or blanket over his head.

Method 2:

Equipment:

Electric plate on asbestos mat.
Tea kettle.
Rubber tubing to fit over spout of kettle.
Funnel.

The electric plate is placed on the bedside table; the kettle of water, with the drug as ordered, is placed on it. One end of the rubber tubing fits over the spout of the kettle; the funnel is attached to the other end. Steam is conveyed to the patient through the rubber tubing and the funnel which is held over the patient's nose. If a cheap tin funnel is used it can be bent to fit quite closely over the nose. Care must be taken not to burn the patient.

A *croup tent* may be arranged to give inhalations to an infant. **For Infant**

Equipment:

Electric plate on asbestos mat.
Croup kettle with long nozzle—containing water and drug as ordered.
Screen with 3 panels.
4 blankets.

Have the infant lie in his crib; fit the screen around the head and sides; cover the top and sides of the screen with blankets to make a closed tent over his head; secure them with safety pins at the sides. If a screen is not obtainable, sticks (like an old broom handle) can be tied to the head and the foot of the crib and blankets suspended from them over the head, foot, and sides to make a closed tent. Place the electric plate and the asbestos mat on a chair at the side of the bed and after the water in the croup kettle is boiling, run the spout under the tent at the corner where the blankets come together. The spout should be at least 2 feet above the patient and the steam should be directed upward and away from him. If he is very active, restrain his hands. The nurse must stay with him constantly while he is having the inhalation. Unless otherwise ordered continue it for ½ hour;

it may be repeated 3 to 4 times daily. After the removal of the steam wipe the child dry, change his clothes if they are damp, and leave him between blankets. The room should be 68° and he should be protected from draughts or exposure; do not take him outdoors for several hours after the treatment.

If a regular croup kettle is not available a tea kettle can be used with rubber tubing fitted over the nozzle for a spout or one may be made of a roll of newspaper inserted into the nozzle.

If the child can be put in a small room, sufficient steam may often be obtained by opening the radiator valve.

Chloroform

(2) *Chloroform* is often given for relief of convulsions; it is given on a mask covered with gauze which is held over the child's nose and mouth. Both chloroform and a mask ready for use should be kept in the pediatric medicine closet for an emergency.

Oxygen

(3) *Oxygen* may be given in cases such as sudden collapse, shock, heart failure, croupous pneumonia, etc.[5] An oxygen tank ready for use should be part of the equipment of a pediatric department and of the room devoted to the care of prematures. Compressed oxygen is furnished in tanks of various sizes; a rubber tube should be attached to the oxygen outlet on the tank to convey the gas to the bottle of water which hangs on the side of the tank; another rubber tube with a funnel on the end of it conveys the gas to the patient. The bottle of water acts as a gauge for the amount of oxygen given, since the bubbles may be counted as they pass through it; unless otherwise ordered allow 10 bubbles a minute. Hold the funnel about 2 inches from the child's nose and mouth. If it is to be given over a long period of time and if he is quiet, a bandage from one side of the crib to the other may be arranged to support the funnel in the desired position over his nose.

[5] Caille, Augustus, M.D., ''Postgraduate Medicine.''

D. Counterirritants.

Counter-irritants

1. *Purpose:*
   a. To dilate blood-vessels of the skin.
   b. To relieve pain and inflammation.

2. *Turpentine stupe* is applied to the abdomen for relief of abdominal pain and distention.

Turpentine Stupe
Purpose

Equipment:

Equipment

1. Basin.
2. Two pieces of soft flannel for stupe cloth.
3. One piece of dry flannel.
4. One piece of oiled silk or muslin a little larger than the flannel.
5. Binder and safety pins.
6. Turpentine in a medicine glass, 1 part to 10 parts of oil (unless otherwise ordered).
7. Applicator to apply turpentine.
8. Two pairs of handling forceps in a glass of 5 per cent lysol solution.
9. Kidney basin.
10. Blanket.
11. Canvas stupe wringer and handles.
12. Towel.

The canvas stupe wringer, containing one piece of flannel, is suspended by the handles across the basin; cover it with boiling water to saturate it; gather it up by the handles and wring it dry; remove the sticks; pour the water from the basin, replace the canvas and flannel, cover it with a towel and take it with the rest of the equipment to the bedside. Turn down the bedclothes to expose the abdomen. With the applicator paint it with turpentine and oil mixture. With the forceps remove the flannel from the canvas and apply it; use great care not to burn the child, since his skin is extremely tender. As a prevention the nurse keeps her hand under the stupe and over his abdomen until she is certain it will not burn. Cover the moist flannel with a dry piece and the oiled muslin; hold all in place with an abdominal binder. Change the stupe every 15 to 30 minutes as necessary to keep it warm,

or as ordered; reapply turpentine and oil every 8 hours if the skin is not reddened by it. After the removal of the stupe wash the skin with soap and water and apply vaselin; leave a dry flannel over it for several hours. If there is an abdominal wound apply the stupe over the sterile gauze dressing which covers it.

Flaxseed Poultice

3. *Flaxseed poultice:*

Equipment

Equipment:

1. Poultice board or newspaper.
2. Poultice pan and spoon.
3. Spatula or knife.
4. Gas burner.
5. Water.
6. Flaxseed.
7. Muslin—double the size of the completed poultice and large enough to allow 2 inches to fold under on all sides, shape it to fit the area to be poulticed.
8. Binder, safety pins.
9. Oiled muslin.
10. Piece of flannel.
11. Vaselin, tongue blade.
12. Paper bag.
13. Towel.
14. Needle, thread.

Spread the muslin on the poultice board; put the pan containing the desired amount of water over the flame; when it is boiling add the flaxseed by sifting it in slowly with one hand and stirring constantly with the other. Continue until the batter is just thick enough to drop from an inverted spoon; remove from the flame and beat it vigorously 3 to 5 minutes. Pour it on ½ of the muslin (a), with the spatula spread it evenly so that it is ⅓ to ½ inch thick; leave a 2-inch margin on the edges to turn in; cover with the other half (b) and turn 2 inches under on 3 sides. If the child is very active baste the edges together. Take it to the bedside folded in a

bath towel on a tray with the rest of the equipment. Anoint the skin over the area to be poulticed with vaselin; apply the poultice, using great caution not to burn the child. The nurse must test the poultice carefully with her hand before applying it. Cover it with the flannel and oiled muslin and hold it in place with the binder pinned loosely. Change as ordered or every 1 or 2 hours as necessary to keep it constantly warm. As soon as the poultice pan is emptied it should be filled with water and should be washed after the poultice has been applied. After the removal of a poultice scrape the flaxseed from the muslin; wash and use it over again.

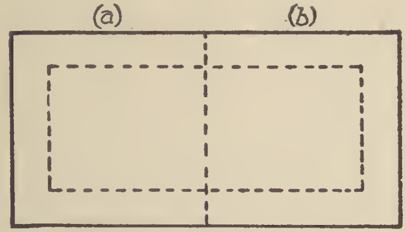

FIGURE 39. TO FOLD MUSLIN FOR POULTICE

4. *Mustard poultice:* Mix 1 part of mustard with 12 parts of flaxseed; add it to the boiling water following the above directions. **Mustard Poultice**

5. *Mustard paste:* **Mustard Paste**

1. Poultice board or newspaper.
2. Bowl, spoon, knife.
3. Mustard, 1 part.
4. Flaxseed, 12 parts.
5. Pitcher of water, 100° F.
6. Muslin—twice the size of the area over which it is to be applied. Crease in the middle and turn in a 2-inch margin on all sides. (See illustration for flaxseed poultice.)
7. Towel.
8. Binder, safety pins.
9. Vaselin, tongue blade.
10. Paper bag.
11. Needle, thread.

Spread the muslin on the poultice board; mix mustard, 1 part, with flaxseed, 12 parts, in a bowl; mix with a little cool

water and add warm water to make a thin paste which can be easily spread. With the knife spread it on half of the muslin (a) following the creases; fold the other half (b) over it and turn 2 inches in on 3 sides; baste the edges together. (See illustration of flaxseed poultice.) Carry it to the patient folded in a warm towel on a tray with the rest of the equipment. With the tongue blade spread the vaselin over the area to which the mustard paste is to be applied; apply the paste, cover with the folded towel and hold it in place with a loose binder; leave it 5 to 15 minutes, watching it frequently, and remove it as soon as the skin becomes reddened; it may be applied several times a day.

CHAPTER XIX

NURSING TECHNIQUE IN GENERAL THERAPEUTIC PROCEDURES
(*Continued*)

E. Other Therapeutic Procedures.

1. *Hot water bottles:* A hot water bottle for a child should never be filled with water over 115° F. Always take the temperature accurately with a bath thermometer; fill the bag half full of water; expel the air and screw on the top; hold it upside down to see that it does not leak. Always have a cover on it and never let it come in direct contact with the child. Outing flannel made into a bag, 18 by 10 inches, with a drawstring in the top makes a good cover. Put the bottle in the bag, neck first, and close the bag by drawing the string. Too much care cannot be exercised in the use of hot water bottles around the child since his skin is extremely tender and sensitive and burns very easily. After use drain all water from the hot water bottle, inflate it, screw on the top, and wipe the outside dry. **Hot Water Bottle Temperature** **Cover**

2. *Electric heating pads* of various sizes are in common use; unless the nurse is extremely vigilant they are unsafe because of the danger of burns from them. There is on the market an asbestos lined copper receptacle to cover the electric beater, which lessens this danger. The nurse should never leave the child alone in the room with an electric heater turned on. **Electric Heating Pad**

3. *The ice-cap* is useful treatment for many conditions in infancy and childhood; it may be applied to the head to relieve pain and to reduce temperature; it may also be used on other **Ice-Cap**

parts of the body to relieve pain. Applied to the precordia it gives the child with heart disease much relief. But as a general thing extreme cold applications, especially ice, must be used with caution around young and delicate infants. To fill an ice-cap: with a spoon fill it half full of ice chopped into pieces the size of small hickory nuts; expel the air and screw on the top. Cover it with a special ice-bag cover or a square piece of gauze with the corners tied over the top. After use the ice-cap should be wiped dry inside and outside, should be inflated with air, and the top should be screwed on. To disinfect a hot water bottle or an ice-cap, scrub the outside with Bon Ami and water and soak in a 1 per cent lysol solution for 15 minutes. If rubber goods are put away for a long time, sprinkle them with talcum powder to preserve the rubber.

Care of Rubber Goods

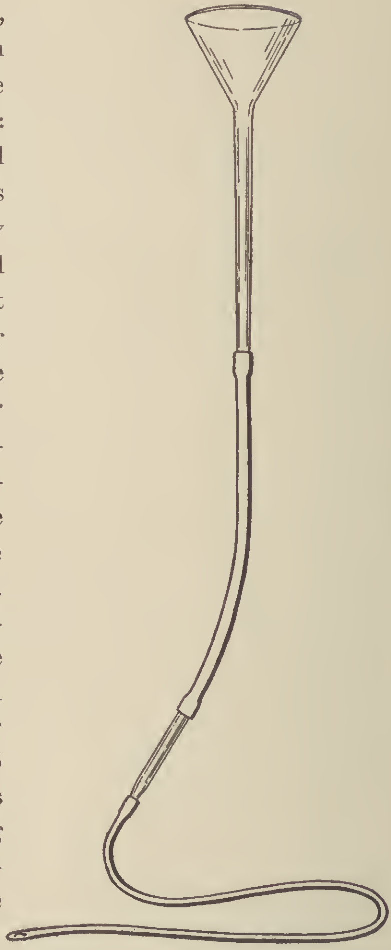

FIGURE 40. EQUIPMENT FOR GAVAGE

Gavage

4. *Gavage* is the introduction of food into the stomach by means of a tube passed through the mouth or the nose.[1]

To Pass Tube through Mouth

a. To pass the tube through the mouth:

[1] Morrow, Albert S., M.D., "Diagnostic and Therapeutic Technique."

Equipment: **Equipment**

1. Glass or enamel funnel
2. Glass connecting tube
3. Rubber connecting tube
4. Catheter.

(1–4:) Boil 2 minutes, place in a sterile towel, take to the bedside with the rest of the equipment on a tray.

5. Food in bottle or graduate heated to 100° F.
6. Bib.
7. Blanket—safety pins.

Size of Gavage Tube

The size of the catheter depends on the size of the child and the nature of the food to be introduced.

For the premature baby use a catheter no. 10 French.
For the child 6 months use a catheter no. 12 to no. 14 French.
For the child 1 year use a catheter no. 16 French.
For the child 18 months use a catheter no. 16 to no. 18 French.
For the child over 2 years use a catheter no. 20 French.

Nelaton Catheter

If the food is very thick, as buttermilk mixture, protein milk, etc., or if the baby has much mucus to obstruct the lumen of the tube, one or two holes may be cut in the catheter above the one already in the end, or if necessary the end of the catheter may be cut off entirely. Thick food may also be forced through the catheter with a syringe. Dr. Julius Hess recommends the use of a Nelaton catheter as it is marked in centimeters or inches and its position at all times can be estimated.[2] A ring screwed to the round at the head of the bed 1 foot above the child is convenient to hold the funnel so that the nurse may use both hands and thus may do the gavage alone.

Position of Child

The child lies on his back in the crib. If he struggles, restrain him by pinning him in a blanket. Put the bib under his chin. Open his mouth by depressing his chin; a mouth gag between the lips may be necessary to prevent an older child from biting the tube. A good substitute for a mouth gag for gavage is an empty spool held between the teeth with the tube run through the hole in it.[3] Hold the catheter in the

[2] Hess, Julius, M.D., "Principles and Practice of Infant Feeding."
[3] McCombs, "Diseases of Children for Nurses."

right hand like a pen; moisten the end by dipping it into the bottle of milk; pass it rapidly through the mouth, through the pharynx into the esophagus. There may be a good deal of gagging as it passes the pharynx, therefore it is passed

FIGURE 41. POSITION OF CHILD FOR GAVAGE

rapidly; then slowly push it down the esophagus; resistance will usually be felt and there will be a second gagging as it passes the cardiac opening of the stomach.[4] It is passed a little beyond this point. In an infant the distance from the alveolus to the cardia is 6¾ inches; at 2 years it is 9 inches; at

[4] Dunn, Charles H., M.D., "Pediatrics."

10 years it is 11 inches. (See note 1.) Hess recommends that the catheter be inserted only 3 or 4 inches for the infant. (See note 2.) A fairly safe maximum can be ascertained by measuring the distance from the glabella to the epigastrium in the individual infant. The entrance of the tube into the stomach may be indicated by a gush of air through it or by the presence of curdled milk in it. After the tube is in the stomach a small piece of adhesive may be put around it at the point where the lips come (or it may be marked with indelible ink) and inserted to this point every time. After the tube is in the stomach raise the funnel as high as possible to allow the escape of gas; then lower it to the ring on the head of the bed and pour the milk into it. Use one hand to steady the child's head and the other to hold the tube at his lips; do not let an ordinary feeding enter the stomach in less than 5 minutes; pinch the tube to check the flow. To remove the tube pinch it off tightly and quickly withdraw it; leave the child comfortable and if he is subject to vomiting leave the bib under his chin and turn him on his right side. Rinse the tube by allowing cold water to run through it; wash it with soap and water; rinse and boil it 2 minutes; put it away in a sterile towel.

Distance to Insert Tube

b. To pass the tube through the nose:

If passing the tube through the mouth for gavage is contra-indicated, as in the case of lesions or an operation wound about the mouth or after intubation, nasal feeding may be substituted. The equipment is the same as for gavage only the catheter is about 2 sizes smaller for the child of corresponding age. The tube is lubricated with petrolatum and several drops of it are instilled into the nostril, through which it is inserted and passed into the stomach, as when it is passed through the mouth.

To Pass Tube through Nose

Equipment

Size of Tube

5. *Duodenal feeding* consists in giving the food through a tube passed through the stomach into the duodenum. It is indicated if the food given by gavage is not retained, as in cases of pylorospasm. The position of the child is the same

Duodenal Feeding

as for gavage; the equipment is the same; the catheter is about 2 sizes smaller for the child of corresponding age. The tube is passed as for gavage only it is inserted 3 to 5 inches farther after it has passed the cardiac opening. Obstruction is met as it passes the pylorus, then the passage is easier and there may be another gush of air through the tube; the fluid aspirated from the duodenum is alkaline in reaction. The fluoroscope may be used to determine the presence of the tube in the duodenum.

Size of Tube

Distance to Insert Tube

Gastric Lavage

6. *Gastric lavage* consists in washing out the stomach by introducing water or other fluid through a catheter and then siphoning it off; it is a very valuable therapeutic measure. (See note 1.)

Equipment

Equipment:

Same as for gavage with the addition of:

1. Graduate with fluid to be used for lavage.
   Solutions which may be used are:

   Sodium bicarbonate, 1 to 5 per cent.
   Boric acid, 1 to 4 per cent.
   Sterile water.
   Amount, 1-4 pints.
   Temperature, 100° F.
2. Large rubber sheet to protect clothing and bed.
3. Basin into which to siphon fluid.

Position of Child

Position of child: (1) Pin him in a blanket; place him on his right side on the edge of the crib with the rubber sheet and bib under his chin and the side of his face; put the basin on a chair or a stool at the crib side.

(2) If there are two nurses to do the lavage, one may sit in a chair and hold him in an upright position on her lap with the back of his head pressed against her chest; the basin is on a stool in front of her. The other nurse sits on a chair facing him and does the lavage. This position may be necessary when dealing with an older child who struggles. The catheter is inserted as for gavage; after it is in the stomach and the air is expelled, fill the funnel with fluid and just

before it has all gone in lower the funnel over the basin and siphon back the solution. Repeat this until it returns clear; 1 to 4 pints may be necessary. **Amount of Fluid**

Removal of Gastric Contents

7. *Removal of Gastric Contents.* It may be necessary to remove the contents of the stomach for diagnostic purposes. This may be done by (a) expression, (b) aspiration or extraction. (See note 1.)

Gastric Expression

Equipment

a. Gastric expression: Equipment is the same as for gavage with the addition of a graduate for the gastric contents. The position of the child is the same as for lavage, (1) on his right side on the edge of the crib or (2) sitting upright on a nurse's lap. The tube is inserted as for gavage and after it is in attempts are made to express the gastric contents by making pressure over the stomach and holding the funnel below the level of the stomach over the graduate. If the child is old enough to coöperate, ask him to strain as if at stool and to bend the body forward while pressure is made over the stomach. If the stomach contents are fluid, there will be no difficulty.

Gastric Extraction

Equipment

b. Gastric extraction or aspiration: The equipment is the same as for gavage with the addition of a rubber aspirating bulb on the end of the tubing and a graduate for stomach contents. The position of the child is the same as for lavage. The catheter is inserted as directed above. The aspiration bulb on the end of the tube is compressed and released, thus drawing out the gastric contents.

Ear Examination

8. *Ear.* Examination of the ear is discussed under examination of the child, Chapter VI.

Myringotomy

Paracentesis of the ear drum is discussed under "Nursing Technique in Minor Surgical Procedures," Chapter XVI.

Irrigation

a. Ear irrigation purpose: To remove cerumen, purulent material, or a foreign body from the external auditory canal.

To Use Irrigating Can

Method 1:

Equipment

Equipment:

1. Rubber and sheet.
2. Blanket and safety pins.

3. Basin.
4. Irrigating can with rubber tubing, clamp on it, and glass connecting tube. Sterilize by boiling 5 minutes.
5. Rubber catheter no. 10 French. Sterilize by boiling 5 minutes.
6. Standard on which to hang irrigating can.
7. Solution as ordered.
   The following may be used:
   (a) Normal saline.
   (b) Boric acid, 2 to 4 per cent.
   (c) Sterile water.
   Amount, 1-5 pints.
   Temperature 100° F.
8. Toothpick applicators.

Position of Child

The position of the child: He lies on his back completely wrapped and pinned in a blanket from his neck to his feet; he may remain in his bed or he may be taken to the common dressing table. Put the rubber and sheet under his head and shoulders and the basin under the ear to be irrigated. The irrigating can with the solution is hung on a standard 1 foot above his head. Expel the air from the tube by allowing solution to run through it. With the left hand pull the lower lobe of the ear down and out (directly opposite from position of adult ear) to straighten the auditory canal; with the right hand introduce the catheter into the external canal so the tip rests against the superior wall, thus allowing space for the solution to wash out cerumen, etc. Irrigate until the solution returns clear; 1 to 5 pints may be needed. After the irrigation dry wipe the canal thoroughly by means of toothpick applicators.

Amount of Fluid

To Use Rubber Syringe

Method 2: A rubber syringe may be used in place of the irrigating can. The position of the child is the same; the bulb is filled with solution, the tip is inserted into the ear, and the contents are expelled, using the same technique as in method 1.

Instillation of Medication

b. Instillations of medication into external auditory canal.

Medications may be ordered instilled into the outer ear. To do this use an ordinary medicine dropper and protect the

child from injury from the glass tip by fitting a small piece of rubber tubing 1½ inches long on the end of the dropper. Sterilize by boiling. Straighten the auditory canal by pulling the lower lobe of the ear down and out; draw up the medication into the medicine dropper; insert the end of the rubber tube into the external auditory canal and instil a few drops

FIGURE 42. MEDICINE DROPPER WITH TIP PROTECTED BY RUBBER

of the medication as ordered. In place of ear irrigation the child with a suppurating otitis media may have an order to have his ear dry wiped: for this, toothpick applicators are used; these should be made with the cotton at the extreme end loose and fluffy to better absorb moisture. The ear should be wiped frequently enough to keep the canal free from dis-

To Dry Wipe Ear

FIGURE 43. TOOTHPICK APPLICATOR TO DRY WIPE EAR

charge; in severe cases it may have to be done as often as every 5 to 15 minutes; in other cases every 1 to 2 hours is often enough. A special nurse is necessary to give the child with suppurating otitis media proper care.

9. *Nose.* a. Nasal irrigation. Purpose: To clean the nasal passages of purulent or profuse discharge.

Nose Irrigation

Equipment:

Equipment

1. Rubber and sheet.
2. Blanket and safety pins.
3. Basin.
4. Irrigating can, rubber tubing, clamp, glass connecting tube, boiled 5 minutes.
5. Catheter no. 10 French, boiled 5 minutes.
6. Solution.

The following may be ordered:

(a) Normal saline.
(b) Boric acid, 2 to 4 per cent.
(c) Sterile water.
(d) Dobell's solution.
(e) Potassium permanganate.
Amount, 1-3 pints, or as ordered.
Temperature 100° F.

Position of Child

Position of child: Wrap and pin him tightly in a blanket to restrain him; place him in the ventral position crosswise of the bed with his head hanging over the edge so that it is lower than his shoulders; place the rubber sheet and pad under his head and shoulders; place the basin on a chair beneath his head. The irrigating can hangs on a standard so that it is 1 foot above him. The nurse supports the child's head with one hand and with the other she introduces the catheter into first one nostril and then the other. He will breathe through his mouth and the irrigating solution will drain from the other nostril, very little of it getting into his mouth. The advantage of this method is that the Eustachian tube being above the irrigating fluid, will not become infected. Further there is less unpleasant gagging.

Instillation of Medication

b. Medications may be ordered instilled into the nostrils; use a medicine dropper with the tip protected by a piece of rubber tubing 1½ inches long; sterilize it by boiling for 2 minutes. Insert the rubber into the nostril and instil a few drops of the medication, as ordered.

Mouth and Throat

10. *Mouth and Throat.* Examination of the mouth and throat discussed under physical examination of the child, Chapter VI.

Gargle

a. A gargle may be used for an older child as for an adult, using the solution ordered. The temperature should be 105° F. The very young child cannot gargle. In place of it (b) a spray may be ordered, or (c) irrigation.

Spray

b. For the spray of the nose and throat any satisfactory

atomizer may be used with the medication ordered. Restrain the child if necessary.

c. Irrigation of the mouth and throat: **Irrigation**

Equipment: **Equipment**

1. Blanket and pins.
2. Sheet and rubber.
3. Basin.
4. Irrigating can, rubber tubing, clamp, glass connecting tube. Boil 5 minutes.
5. Catheter no. 10 French. Sterilize by boiling 5 minutes.
6. Solution as ordered.

   The following are sometimes used:

   (a) Normal saline.
   (b) Boric acid, 2 to 4 per cent.
   (c) Sterile water.
   Amount, 1-5 pints.
   Temperature, 100° F.

Position of Child Position of child: Wrap and pin him in a blanket; put the rubber and sheet under his head; turn him on one side and hold him with his face well over to the side; place the basin under his mouth and nose. Insert the tip of the catheter into the mouth, which should be held open to allow the solution to run in and out freely and into the basin. A mouth gag may be necessary.

Eye 11. *Eye.* Eye examination discussed under physical examination, Chapter VI.

Irrigation a. Eye irrigation. Purpose: To cleanse the eye of purulent discharge, as in ophthalmia neonatorum.

Equipment: **Equipment**

1. Blanket and safety pins.
2. Rubber and sheet.
3. Kidney basin.
4. Cotton pledgets and basin for solution. (Sterile.)
5. Handling forceps in glass of 4 per cent boric acid solution.
6. Solution as ordered.

The following may be used:

(a) Normal saline.
(b) Boric acid, 2 to 4 per cent.
Amount, 1 to 2 pints.
Temperature, 90° F.

Position of Child

Position of child: Wrap and pin him in a blanket; place him crosswise of the bed, the nurse standing at his head. Put the rubber and sheet under his head; to irrigate the right eye turn his head on the right side; put a dry pledget over the left eye; place the kidney basin under the right side of his face. The nurse holds his head in position with the palm of her left hand and holds his eyelids open with the thumb and finger of that hand, making pressure on the bones of the orbit and not on the eyeball. With the forceps she dips a cotton pledget in the basin of solution, then takes it in the fingers of her right hand, holds it at the inner canthus of the right eye, squeezing the solution from it over the eyeball. The stream must not be directed on the eyeball, but must flow indirectly over it. Repeat until the eye is free from discharge, using a clean pledget every time. To irrigate the left eye, turn the child's head on the left side, put a dry pledget over the right eye, and proceed as before; use solution enough to cleanse the eyes, 1 to 2 pints may be necessary in severe infections, as gonorrheal ophthalmia; the irrigation may have to be repeated every 15 minutes to every 2 hours. After the irrigation wipe each eye with a separate dry sponge, beginning at the inner canthus and wiping toward the outer.

Amount of Fluid

Dangers to Be Avoided

There is danger of corneal ulcer in most eye conditions, therefore avoid (a) pressing on the eyeball when holding the lids open, (b) dropping the solution directly on the eyeball, (c) letting the discharge from one eye run into the other.

Instillation of Medications

b. To instil drops in the eye:

Medications of various kinds, as argyrol, may be ordered. Use a medicine dropper, protecting the tip with a small piece of rubber tubing. To instil drops into the left eye hold the child's head on the left side; hold the eye open and drop the

desired amount of medication at the inner canthus, allowing it to run over the eyeball toward the outer canthus; press the lids together, holding them a minute, and wipe them with a dry sponge; always wipe away from the nose. Instil drops into the right eye in the same manner with the child's head on the right side.

c. Cold applications to the eyes:

Cold Applications to Eye

Purpose: To relieve inflammation, as in gonorrheal ophthalmia.

Equipment:

1. Cotton ½ inch thick, the shape and size of the eye.
2. Basin with a large piece of ice.
3. Basin with boric acid solution, 2 to 4 per cent.
4. Paper bag for waste.

Dip the cotton pledget in the boric acid solution and place it on the ice until it is thoroughly cold, then apply it to the eye; use a separate one for each eye and do not use the same one twice; put the discarded ones in a paper bag. Do not let the pledget from either eye come over the bridge of the nose. Applications are changed as ordered; usually they are put on for 15 minutes out of every hour and during that time they should be changed every 1 to 2 minutes.

Vaginal Douche

12. *Vagina.* a. A vaginal douche may be ordered for a little girl who has a gonorrheal vaginitis.

Equipment

Equipment:

1. Blanket.
2. Half sheet.
3. Rubber and pad.
4. Bed pan or douche pan.
5. Rubber catheter no. 10 to no. 15 French.
6. Irrigating can with rubber tubing, clamp, and glass connecting tube.
7. Sponges in basin of 4 per cent boric acid solution.
8. Bath thermometer.
9. Handling forceps in glass of 5 per cent lysol solution.
10. Kidney basin.
11. Paper bag.
12. Standard on which to hang irrigating can.

Solutions which may be ordered are:

Bichloride of mercury, 1 to 10,000.
Boric acid, 2 to 4 per cent.
Normal saline.
Potassium permanganate, 1 to 2000 to 1 to 5000.
Amount, 2 quarts unless otherwise ordered.
Temperature, 100° F., unless otherwise ordered.

The irrigating can, rubber tubing, catheter, and kidney basin are boiled 5 minutes. The irrigating can with the solution, covered with a towel, and the kidney basin containing the sterile catheter are put on a tray with the rest of the equipment and carried to the bedside. Fan fold the upper bedclothes to the foot of the bed; put a blanket over the child's shoulders; use a half sheet to drape her (see method under catheterization); place the rubber and pad under the hips. **Position of Child** She lies on her back with her knees flexed and one small pillow under her head; put the douche pan under her so that her buttocks are even with the opening of the pan; make her comfortable by placing a folded blanket or small pillow under her back at the top of the pan. (A bed pan, if it is large enough to hold the fluid, may be used in place of a douche pan.) Hang the irrigating can on the standard 1 foot above the child; attach the catheter to the end of the tube. Expel the air from it and warm it by allowing the solution to run through it for a minute into the douche pan. Clean any discharge from the vulva with boric sponges, wiping downward toward the rectum; separate the labia majora with the right hand, insert the catheter into the vagina, down and back, 1 to 3 inches depending upon the size of the child. **Distance to Insert Tube** Hold it in place while the solution is flowing and turn it around in the vagina so that every part is irrigated equally, clamp off the tube and remove the catheter before the douche can is entirely emptied; put the soiled catheter into the kidney basin; remove the blanket and the half sheet. If the douche is given as a regular treatment at stated intervals, the half sheet used for draping may be folded away in

the child's locker and may be used every time; or it may be used for a draw sheet the next time her bed has to be changed.

b. Medications, as argyrol, may be instilled in the vagina with a medicine dropper. To do this fit a piece of rubber tubing 2 inches long on the tip of it and insert only the rubber into the vagina; this will prevent possible injury to the delicate mucous membrane from the glass tip. To inject ointment into the vagina fill a small triumph syringe with ointment; protect the glass tip with a piece of rubber tubing 2 inches long; insert it into the vaginal orifice, squeezing in the ointment. This syringe may be placed on a clean towel and is used only for the treatment because it is too difficult to clean after every medication. Applications, as silver nitrate, may be made with a swab through a speculum. A nasal speculum answers very well for little girls. **Instillation of Medication**

To give a vaginal suppository, the patient lies on her back with her knees flexed; the nurse puts a rubber glove on her right hand, takes the suppository, separates and holds the labia with the left hand and inserts the suppository into the vaginal opening as far as it will go. **Vaginal Suppository**

13. *Rectum.* **Enema**

(a) An enema is given: **Purpose**

1. To cleanse the lower bowel and empty it of feces.
2. To give nourishment.
3. To give medications as sedatives for:
   a. General effect.
   b. Local effect.
4. To give stimulation or extra fluids.
5. To reduce an elevation of temperature.

(1) Cleansing enema: **Cleansing Enema**

(a) Purpose: To cleanse the lower bowel and to empty it of feces.

(b) Equipment: (To be carried to the bedside on a tray.) **Equipment**

1. Irrigating can and tubing 18 inches long with glass connecting tube.
2. Clamp on tube.

3. Standard on which to hang can.
4. Solution ordered, 100° F., never over 105° F.
5. Kidney basin.
6. Vaselin or oil, square of paper for applying it.
7. Small rubber sheet and pad.
8. Bed pan and cover.
9. Bath thermometer.
10. Toilet paper.
11. Blanket and safety pins.
12. Catheter for rectal tube.
    Size no. 10 to no. 12 French for child up to 6 months.
    Size no. 12 to no. 15 French for child up to 1 year.
    Size no. 15 to no. 18 French for child up to 2 years.
    Size no. 18 to no. 20 French for child over 2 years.
    (A funnel attached to the tubing and a pitcher for the solution may be used in place of the irrigating can and standard.)

Solutions

(c) Solutions for cleansing enema.

For a child under 2 years plain warm water or normal salt solution will usually produce the desired results and should be used unless otherwise ordered. If soap is ordered use a plain castile soap in proportions of 1 tablespoon of soap jelly to a pint of water. Yellow or laundry soap may be very irritating and should not be used. Skim the foam from the top of the solution.

Amount of Solution

(d) Amount of solution necessary:

This depends upon the size of the child and upon the purpose of the enema. For a cleansing enema for catharsis: A child under 6 months should have a pint at least; a child over 6 months should have a quart. The solution is expelled as soon as it is given, in most instances, so that the enema is really a colonic flushing.

(e) Procedure:

1. Have room 70° F.
2. Screen the child's bed. (One nurse should be able to give a baby or child an enema without help.)

3. Position of the child: **Position of Child**

I. Under 6 months: **Under 6 Months**

Place rubber and pad under his buttocks to protect the bed, remove diaper, fold his clothes back to the waist, and put the blanket over his shoulders. He is placed on a warm bed pan or douche pan covered with a pad and is placed with his buttocks over the edge of the hole. The nurse holds his two ankles in her left hand, elevates his feet, and uses her right hand to give the enema.

II. Child from 6 months to 5 years: **Six Months to 5 Years**

Restrain his hands by pinning them in a blanket. Protect the bed with a rubber and pad; place the warm bed pan under his buttocks with a folded diaper over the part which comes in contact with his back; if the pan is so constructed that there is a hollow at the back, fill it with a small pillow or a folded blanket (covered with rubber). (Any child under 5 years or any sick child will expel the fluid while the enema is being given.) If a marble or porcelain bath slab is a part of the equipment, the small child may be placed here for his enema, first covering the slab with a pad—following out the same rules for individual technique as given under the directions for bathing.

III. Child over 5 years: **Over 5 Years**

As soon as the child is old enough to understand, he should not be put on a pan while the enema is being given. His position may then be the same as for an adult, i.e., left lateral with hips elevated, no pillow under head; or in dorsal position, no pillow under head, and knees flexed.

(f) Method of giving enema: **Procedure**

Place standard at side of crib, hang irrigating can on it not more than 1 to 1½ feet above the child. Attach catheter to tubing, expel air from tube, warm it by permitting solution

to flow until tube is filled with warm solution; close clamp, vaselin the tip of the catheter 1½ to 3 inches. Insert it carefully into the anus, guiding it by the right hand, in which it is held; use a slight boring motion, keeping in mind the position of the anal canal. If the child is on his back direct the tube first upward and then downward and backward. If he is in the left lateral position direct the tube upward, backward and toward the left. If there is difficulty in inserting the tube it may be: (1) Obstruction by feces, (2) a nervous contraction of the sphincter, or (3) the point of the tube may be caught in a fold of mucous membrane. Wait a moment, then withdraw the tube slightly and again advance it; by opening the stopcock after the tube is inserted the flow of fluid may remove the obstruction. Insert the rectal tube 2 inches in the small baby, 3 inches in the older child, but never insert more than 4 inches.[5] Give the fluid slowly, for rapid distention of the colon stimulates peristalsis with the consequent desire to evacuate. Stop the flow temporarily if severe pain seems to be caused. Quickly withdraw the tube and if the child has not already started to expel the fluid, hold a folded towel over the anus making pressure until the desire to expel the enema has passed. Leave the older child on a pan until all the fluid is expelled. The small baby who has been expelling the fluid as the enema is being given can be removed from the pan at once.

Distance to Insert Tube

Care of Tubing

(g) The cleansing of tubing, etc.:

Disconnect the catheter and place it in the kidney basin. Wash the irrigating can and tubing, dry the can and return it to the shelf. Dry the tubing by stripping and draining, coil it with the stopcock open. Wash the rectal tube or catheter in cold water, then in warm water and soap and boil for 3 minutes. The use of sodium chlorid, 1 teaspoon to 1 quart of water, is supposed to lessen the damage to the tubing by boiling.

[5] Mills, H. B., M.D., Bird, G. C., M.D., *Penn. Med. Journal*, March, 1919.

(2) The small enema: **Small Enema**

(a) Purpose: Medications, nourishment, or other solutions to be retained for absorption are given this way. The bulk of fluid should not be large enough to distend the walls of the intestine. **Purpose**

(b) Equipment: carried to bedside on a tray: **Equipment**

1. Basin of water 105° F. in which is placed a small pitcher containing the solution to be injected.
2. Catheter, the smallest size that the solution will run through.
3. Funnel, rubber tubing, 18 to 24 inches long, clamp on tube, glass connecting tube.
4. Kidney basin.
5. Vaselin—paper square to apply it.
6. Small rubber sheet and pad.

(c) Procedure: Screen the bed; place the child in the dorsal position, with the pillow removed from under his head, and his hips elevated by a pillow protected by a rubber and a pad. Attach the catheter to the tubing, lubricate the end, and insert it as far as for the cleansing enema, 2 to 4 inches. Give solution, pouring it on the side of the funnel to prevent the forcing of the air in the tube into the colon; raise the funnel from 8 to 12 inches above the child as the fluid flows in. After the fluid has been introduced, pinch off the tube, hold the buttocks together with the hand leaving the tube in for 3 minutes, then withdraw it slowly, pressing the child's buttocks together with the hand, holding them this way and elevating them for 5 minutes or so. **Procedure**

A. *Suds and Glycerin Enema:* **Suds and Glycerin Enema**

Water, 1 quart.
Soap jelly, 2 tablespoonfuls.
Glycerin, 2 ounces.

B. *M. G. W. Enema:* **M. G. W. Enema**

One ounce magnesium sulphate.
One ounce glycerin.

Two ounces water.

Dissolve magnesium sulphate in hot water, stirring until dissolved, then add glycerin.

Sedative Enema

C. *Sedative Enema:*

Chloral hydrate or bromids may be given by rectum; dissolve in 15 c.c. to 30 c.c. of hot water, milk, or starch, as ordered. Before giving a sedative enema always make the patient as comfortable as possible so that he may have an opportunity to be benefited by it. Clean the rectum of feces by giving a cleansing enema ½ to 1 hour before giving the sedative. (Give according to the directions under "Small Enema.")

Nutritive Enema

D. *Nutritive Enema:*

Purpose

To give the patient nourishment if he cannot take it by mouth.

When giving a nutritive enema over any length of time give a cleansing enema of normal saline or soap suds once a day. A concentrated food must be given, the amount depending upon the size and the age of the child, usually 2 to 6 ounces every 4 to 6 hours.

Materials Used

The materials generally used are:

1. Peptonized milk.
2. Peptonized beef juice.
3. Peptonized beef extracts.
4. Egg albumen.
5. Gruels.
6. Dextrose.

(The nutritive enema has a limited use for small children because, as a rule, they retain fluids by rectum poorly. As a temporary expedient or adjunct to natural feedings, it is most useful, but for permanent feeding quite impractical. See note 1.)

Shock Enema

E. *Shock Enema:*

Two ounces salt solution.

One to 2 ounces brandy.

Two ounces black coffee or 5 gr. caffein citrate.

F. *Stimulating Enema.*

Stimulating Enema

For general stimulation and to increase fluid intake.

1. Normal saline solution, .9 of 1 per cent (1 teaspoonful to 1 pint).
2. Glucose 5 per cent in normal saline solution or in water.
   Give every 2 to 6 hours.
   Amounts vary with the age of the child.
   A child under 2 years, 30 to 90 c.c.
   A child 2 to 4 years, 90 to 120 c.c.
   A child over 5 years, 120 to 180 c.c.

(A small child will usually retain fluids by rectum better by this intermittent method than by continuous proctoclysis or "Murphy drip method." However, the latter is often used and sometimes is retained very satisfactorily.)

G. *Oil Enema:*

Oil Enema

To soften feces in severe constipation.

One to 4 ounces of oil (Cottonseed or Wesson).
Warm it, insert rectal tube and give very slowly.
This is to be retained and followed by a suds enema in from 2 to 6 hours.

H. *Milk and Molasses Enema:*

Milk and Molasses Enema

To relieve fermentation and distention.

Three ounces warm milk and 3 ounces warm molasses well mixed, give slowly and follow in one hour with warm water enema.

I. *Turpentine Enema:*

Turpentine Enema

Add 10 to 30 minims to 1 quart of soap suds solution.

J. *Starch Enema:*

Starch Enema

To relieve local irritation, to check diarrhea or to introduce drugs.

One-half tablespoonful of starch dissolved in cold water, add slowly 6 ounces of hot water and boil, avoid too thick consistency. When it is cooled to body temperature it is ready for use. If it is used to introduce a drug, give only 15 c.c. to 30 c.c. of starch, and add drug to it after it has cooled to 100° F.

Enteroclysis b. Enteroclysis or colon irrigation:

Purpose (1) Purpose:

1. To cleanse the bowel.
2. To reduce temperature.

Solutions (2) Solutions used:

1. Plain water.
2. Saline or whatever solution ordered.

100° F. (If to reduce temperature start with 100° F. and cool gradually to 75° F. by adding cold water.)

(3) Equipment: Same as for cleansing enema.

(4) Procedure:

Position Position of child: On his side or on his back, with the buttocks elevated on a pillow covered with rubber and no pillow under his head.

Procedure The irrigating can is hung on the standard so that it is not more than 8 to 12 inches above the child; the rectal tube is inserted 1½ to 3 inches in the rectum. A pint of fluid is given at a time, the tube is clamped off, and when that is expelled another pint is given; this is continued until the fluid returns clear; 1 to 4 quarts are usually necessary. A child, especially a small one, will usually expel the fluid all the time it is being given.

Distance to Insert Tube

Proctoclysis c. Proctoclysis, known also as rectoclysis, seepage and Murphy drip:

Purpose (1) Purpose: Continuous instillation of fluid.

(2) Equipment:

Equipment

1. Irrigating can with solution of 100° F.
2. Rubber tubing.
   a. One piece 26 inches long.
   b. One piece 16 inches long.
   c. Two pieces 8 inches long.
3. Glass connecting tube.
4. Glass Y connecting tube.
5. Catheter, as small as possible.

6. Narrow piece of adhesive.
7. Rubber with pad or diaper.
8. Standard upon which to hang the irrigating can.
9. Murphy drip bulb.
10. Clamp to adjust flow.
11. Two hot water bottles.
12. Towel.
13. Safety pins.
14. Vaselin.
15. Paper square to apply it.

Apparatus

(Apparatus: The irrigating can hangs on the standard. The piece of rubber 16 inches long fits on the lower part of the Y connecting tube and connects with the rectal tube with a glass connecting tube. One end of the 8-inch rubber tubing fits on one branch of the Y tube; the other end fits one end of the Murphy drip bulb which is connected with the irrigating can by the other 8-inch tube on which is adjusted the clamp to regulate the flow of the fluid. The other piece of rubber tubing 26 inches long fits on the other branch of the Y tube and is fastened to the outside of the irrigating can to allow a means of escape for air expelled by the patient.)

Procedure

(3) Procedure: The bed under the patient is protected by a rubber and pad. Expel the air from the tubing and warm it by allowing the solution to run through it until it is warm; clamp the tube; lubricate the end of the catheter and insert it in the rectum 3 to 5 inches. A narrow strip of adhesive 10 inches long is put around the catheter where it enters the rectum and is strapped on to the buttocks on either side to hold the tube in place. A sick child or a small child not old enough to understand the procedure will pull the tube out of his rectum. It may be necessary to tie his hands.

Distance to Insert Tube

Rate of Flow

The rate of flow is gauged by adjusting the clamp on the rubber tubing and observing it through the Murphy drip bulb. It is safe to start at 10 drops per minute for a child under 5 years, and 15 to 20 drops for a child over that age. The rate of flow may be increased if the child can tolerate it. It should be allowed to flow as rapidly as possible, but not so rapidly

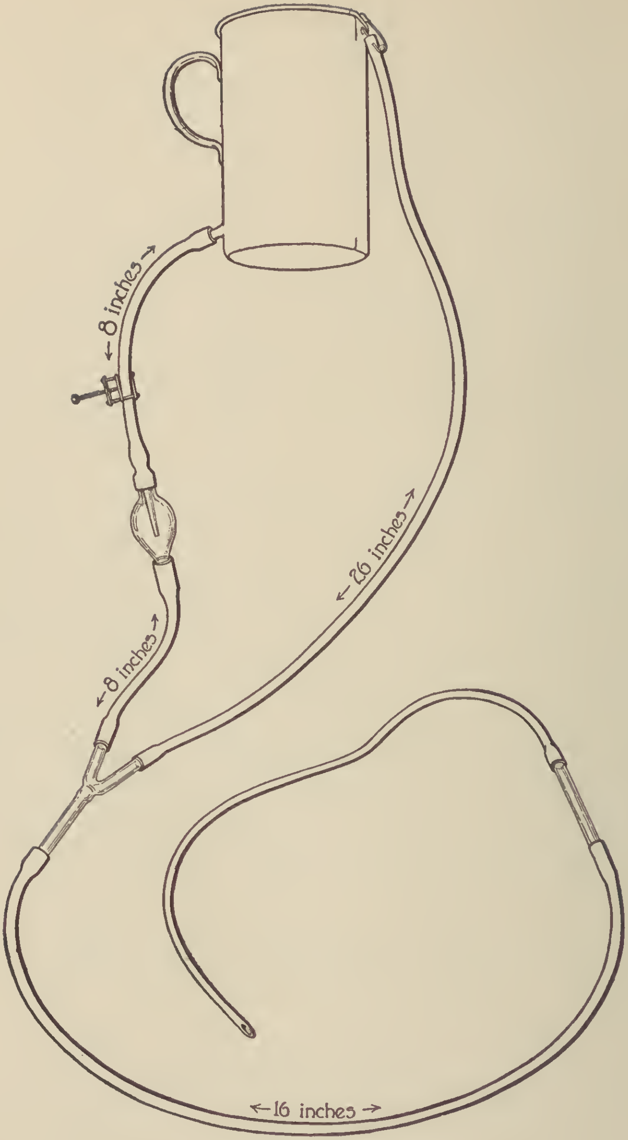

FIGURE 44. EQUIPMENT FOR PROCTOCLYSIS

that the rectum will be worn out in a few hours. Proctoclysis is usually ordered for 2 or 3 hours and then off for 2 or 3 hours to give the rectum a rest so that it can retain and can absorb fluid over a longer period of time. Proctoclysis is more successful if a cleansing enema is given a short time before it is started and once a day as proctoclysis is continued.

Temperature of Solution

The fluid in the irrigating can is 100° F. when proctoclysis is started. Experiments at the University Hospital, University of Minnesota (by Miss E. Pierce), have shown that by the time the fluid reaches the rectum it is room temperature, no matter at what temperature it was started. If efforts are made to keep the fluid in the can at 100° F. by the use of a thermos bottle or by an electric light bulb immersed in it, it still is at room temperature when it reaches the rectum. The only way to keep the fluid at 100° F. when it enters the rectum, if the above apparatus is used, is to have the tube between 2 hot water bottles 135° F., placed about 12 inches from where it enters the rectum. It is not safe to put hot water bottles at this temperature in a child's bed unless there is some one there to watch him closely and then the bottles must be entirely covered by wrapping a bath towel around both and pinning the corners together to hold them in place.

Amount of Fluid

The amount of fluid taken by proctoclysis is measured and is recorded. First measure the amount put into the irrigating can. Record the amount put in, if refilled. If discontinued before all is taken, measure the amount remaining and subtract it from the amount put into the can. If intermittent, measure the amount when started and the amount remaining when discontinued. Record the amount taken.

Rectal Suppository

d. To give a rectal suppository:

(1) Position: Left lateral.

(2) Procedure: The nurse puts on a rubber glove or a finger cot, lubricates the end of her finger and the tip of the suppository, and passes it into the rectum, pushing it with her finger as far as it will go.

To Catheterize Girl

14. *Bladder.*

a. To catheterize a girl: (University Hospital Routine, University of Minnesota.)

Equipment:

Equipment

1. Two sterile catheters no. 8 to no. 10 French (rubber catheters only are used) in a basin.
2. Basin of warm sterile boric acid 2 per cent solution with sponges in it.
3. Kidney basin.
4. Sterile handling forceps in basin with catheters.
5. Sterile basin, or
6. Sterile bottle for urine.
7. Rubber and diaper.
8. Bed pan for an older child.
9. Blanket.
10. Half sheet.

Boil the catheters (1) and handling forceps (4) for 5 minutes; sterilize the boric acid solution, the sponges (2), and the bottle for the specimen (6) by boiling in a small round pan (2) covered with a pan (5). It is desirable to have two nurses to catheterize a small active child, because one has to hold her in position while the other catheterizes her. While one nurse drapes the patient and arranges the equipment at the bedside, the other one scrubs her hands. If it is impossible to have two, one nurse can do it alone if she ties the child's legs to the side of the crib, arranges her equipment, and then scrubs her hands. The child lies on her back with her knees flexed and separated; a rubber and diaper are put under her buttocks; an older child may be placed on a bed pan. A blanket is placed over her shoulders; the upper bedclothes are fan folded to the foot of the bed. A half sheet is used to drape her; place it over her crosswise, twist one lower corner around each foot, tuck the ends of the sheet under her hips on either side, bring the center of it in folds up over the pubis exposing the vulva. It is not possible to drape a small child who struggles.

Position of Child

To Scrub Hands

The nurse who is to do the catheterization scrubs her hands

for 4 minutes; she uses a brush and soap and hot water, rubbing them well, and cleans her nails with an orange wood stick, then rinses her hands under hot running water for 1 minute. One nurse stands on the left side of the bed and holds the patient in position; the other stands on the right side with the equipment tray on a table at her right. The basin for urine is put on the bed between the patient's feet. With the right hand the nurse takes the handling forceps from the basin; with them she removes a sponge from the basin of boric solution and cleans the outside of the labia, wiping down toward the rectum. Separate the labial folds with the thumb and finger of the left hand and clean the introitis first on one side and then on the other, using a fresh sponge every time, and as many as necessary. Clean the meatus with a fresh sponge, wiping away from it on all sides. Soiled sponges are put in the kidney basin. Hold a warm sponge over the meatus to dilate it, thus allowing the easier passage of the catheter. Place a sponge below the labia over the rectum. Remove the catheter from the basin with the right hand, taking hold of it about 3 inches from the tip with the thumb and forefinger, and supporting it with the other fingers; place the other end in the sterile basin between the child's feet; separate the folds of the labia with the left hand and introduce the tip of the catheter into the meatus until urine flows—usually ½ to 3 inches, depending on the size of the child.

To Clean Genitals

It is often difficult to find the meatus of a baby girl; the vaginal opening may be mistaken for it, as it may be a blind opening in what seems to be the vaginal orifice. In this case insert the extreme tip of the catheter into this opening and then take a turn up and back to find the meatus. Before attempting to introduce the catheter determine the exact location of the urethra. Do not grope blindly around searching for it, thus contaminating the catheter. If an obstruction is met when inserting the catheter, wait a minute before pushing it further because it may be a nervous contraction of the

Distance to Insert Catheter

sphincter and, if so, it will pass away in a minute. If the urine stops flowing before the expected amount is obtained, withdraw the catheter a little to the level of the urine in the bladder. When withdrawing the catheter pinch it off and draw it out quickly. The sheet used for draping can be folded away in the child's locker and used for a draw sheet when it is necessary to change the bed.

To Catheterize Boy

b. To catheterize a boy:

The nurse is frequently required to catheterize a boy. The equipment is the same as given above.

Two nurses are desired; one can do it alone in an emergency. The child's position and draping are the same and the external genitalia are cleaned in the same manner. Hold the penis at an angle of about 60° from the body with the left hand; retract the prepuce and hold it back by wrapping a piece of gauze around it; sponge the glans clean. Take the catheter in the right hand and introduce it into the urethra as far as it will go. If it meets an obstruction, which is a nervous contraction, wait a minute or more and this will disappear and the catheter can be passed easily into the bladder.

CHAPTER XX

SPECIAL PEDIATRIC NURSING

The object of this chapter and the next one, "Infectious Diseases," is to emphasize the points that differ in the nursing care of the sick child from that of the adult and such points as experience has shown will be helpful to the pediatric nurse. It is taken for granted that she has had one or two years of training in the care of adults, including lectures and classes in medical and surgical nursing. No attempt has been made to go into the details of the etiology, pathology, lesions, symptoms, course of the disease, diagnosis, or prognosis, etc., of the diseases mentioned, except as they may influence the intelligent nursing care of children suffering from such diseases. The nurse should obtain her information of the above diseases from lectures by the medical staff and by additional reading of works on pediatrics. "Diseases of Infancy and Childhood" by L. Emmett Holt, M.D., Sc.D., LL.D., and John Howland, M.D., A.M., and "Diseases of Infants and Children," by J. P. Crozer Griffith, M.D., Ph.D., have been consulted and quoted from freely; and the points brought out in the nursing care of children with various diseases follow more or less closely the treatment advocated by these authorities.

1. Diseases of the Newborn Baby.

Prematurity

Prematurity demands the most expert nursing care. (See care of the premature, Chapter VIII.)

Asphyxia

Asphyxia is taken up under the care of the newborn and methods of resuscitation are discussed there. (Chapter VII.)

Congenital Atelectasis

Congenital atelectasis is the failure of the lungs to fully expand and to function properly; it is usually associated with asphyxia directly after birth, but may not develop until later.

Cyanosis is the most characteristic symptom. Artificial respirations are generally employed in the treatment of atelectasis but causing the infant to cry is the best treatment. He should be made to cry loudly and strongly several times a day for from 15 to 30 minutes. To do this the alternate use of hot and cold baths (100° F. to 70° F.) may be employed, also spanking or other procedures which will produce lusty crying. The cyanosis will then disappear. The cyanosis of the newborn due to congenital heart disease will become worse if the child cries. The child with atelectasis must have his position changed frequently, and he should be picked up and carried around at regular intervals. He may also need external heat to maintain his body temperature.

Congenital Malformations

Congenital malformations and anomalies must be looked for in the newborn during his first bath. A few of the common ones are:

1. Cleft lip. (See classification under diseases of digestive system.)

2. Cleft palate.

3. Epstein's pearls are little whitish epithelial masses on the palate of the newborn; they are probably embryonic cell rests which follow the ventral closure of the embryo. They are observed in a large majority of cases and have no significance. No attempt must ever be made to remove them. After a few days they spontaneously drop off and disappear.

4. Spina bifida. (Discussed under diseases of nervous system.)

5. Hydrocephalus. (Discussed under diseases of nervous system.)

6. Hernia. (Discussed under diseases of digestive system.)

7. Congenital malformations of bones, as club-feet, polydactylism, etc.

8. Congenital malformations of urogenital organs.
   - Phimosis.
   - Hypospadias.
   - Epispadias.

Extrophy of bladder.
Undescended testicle.
Hydrocele.
Imperforate hymen.
Imperforate vagina.
Imperforate uterine canal.

9. Malformations of rectum.
Atresia or stenosis of rectum.
10. Stenosis of esophagus.

These malformations when noted should be reported at once. Nearly all of them are very evident if present, except the congenital atresias, as of the rectum, urethra, or esophagus. They occur frequently enough for the nurse to have in mind always the possibility of their presence in every newborn babe until she has had opportunity to rule them out. Therefore, it is essential that she watch for the first urination and defecation and the absence of either by the end of 12 hours should be reported. Excessive vomiting after nursing should also be reported. The only treatment for any of these conditions is surgical.

Icterus Neonatorum

Icterus neonatorum is a yellowish discoloration of the skin of the newborn; it appears from the third to the sixth days over the whole body, varying in intensity; it is noticed in about 40 per cent of newborn babies. The baby's general condition is not usually influenced and the condition disappears without any treatment. The exact cause has never been satisfactorily determined. The nurse must always report the condition to the doctor; she may also assure the mother that her baby is not ill and that the color will disappear.

Hemorrhages of Newborn

Hemorrhages occur quite frequently during the first days of life. They may be divided into two groups:

I. Traumatic or accidental which depend upon causes connected with delivery.
    1. Cephalematoma.
    2. Visceral hemorrhage.

II. Spontaneous hemorrhage—hemorrhagic disease of the newborn.

1. Hemorrhage from intestines, or melena.
2. Hemorrhage from stomach.
3. Hemorrhage from mouth.
4. Hemorrhage from nose.
5. Subcutaneous hemorrhage.
6. Hematuria.
7. Hemorrhage from conjunctiva.
8. Hemorrhage from female genitals.
9. Hemorrhage from umbilicus.

Any signs of hemorrhage, even the slightest, should be reported at once. Hemorrhage of the newborn is often accompanied by prolonged bleeding and clotting time; so these are usually determined routinely on all newborn babies. If they are exaggerated, treatment is generally started at once; this consists in subcutaneous or intramuscular injection of whole blood.[1] (See description of method, Chapter XVI.) Bleeding from the umbilicus must always be watched for during the first few hours of life; this may be due to faulty tying of the cord, as well as to hemorrhagic disease. Baby girls often have a slight bloody discharge from the vagina during the first few days. This may indicate hemorrhagic disease or it may be without significance; it must always be reported at once.

Engorgement of the Breasts

Engorgement of the breasts is frequently seen in the first few days after birth, usually about the time the mother's milk comes; it is believed to occur more often in boys than in girls. The breasts contain milk which the old German midwives called "Hexanmilch" (Witches' milk). This engorgement disappears without treatment and, in fact, the breasts must not be massaged or handled and should be protected from pressure. The condition must be called to the doctor's attention.

Mastitis

A complication occasionally seen is a true mastitis. The

[1] Rodda, F. C., M.D., "Studies in a New Method of Determining the Coagulation Time of Blood in Newborns." *Am. J. Dis. Child.*, April, 1920.

breast, generally only one, grows uniformly larger, red, hot, and painful on pressure. Ice may be ordered as a prophylactic measure. A small soft rubber ice collar about 6 inches long makes a suitable ice-cap. If an abscess does form, the treatment is surgical.

Infections of the Newborn

Infections of the Newborn: The newborn may suffer from any of the infectious diseases, as measles, mumps, etc. They rarely do occur, however. If the baby contracts an infectious disease, it is usually when the mother has the disease and infects the child before birth through the circulation or after birth from contact. Pertussis in the newborn and in young infants has a high mortality. The newborn must always be protected from the possibility of any infection whenever it is known to be present in the mother or in the household or institution. (See contraindications to nursing, Chapter X.) Sepsis is no longer common in the modern nursery, though there are rare cases. Aseptic nursing technique is a certain prophylactic measure.

Infection of the Umbilicus

Infection of the umbilicus, or omphalitis, does not occur as frequently as it once did. It is caused by uncleanliness and lack of aseptic care of the umbilical cord after birth. The skin around the umbilicus becomes red, hot, shiny, and frequently the subcutaneous tissue is infiltrated and hard. The treatment is, first of all, prophylactic, and if the nurse carries out aseptic technique in the care of the umbilicus infection will not occur. Any redness or any unusual appearance around the cord must be reported. (See care of umbilicus, Chapter VII.)

Gonorrheal Infection

Gonorrheal infection of the newborn occurs in the eyes and in the vagina of baby girls. Ophthalmia neonatorum is a gonorrheal infection of the eyes of the newborn, contracted from the mother during the passage of the child through an infected birth canal, or after birth from contact with infected clothing or other articles. It does not usually manifest itself before the third day, and is extremely virulent from the onset. The symptoms are: swelling of the lids, or chemosis,

Ophthalmia Neonatorum

profuse purulent discharge, sometimes hemorrhages from the lids, ulceration, and there may be sloughing of the cornea. Loss of vision follows severe cases if treatment is not started at once. The first treatment is prophylactic. This is known as Credé's treatment of the eyes of the newborn and consists in the instillation of silver nitrate, 1 or 2 per cent, 1 or 2 drops in each eye, immediately after birth, followed by salt solution. Even though this is generally carried out, in fact it is compulsory in most states, infections do sometimes occur. Complete isolation of the patient is necessary since the disease is highly infectious, and the nurse must protect herself as well as the other patients. If the infection is in one eye only, efforts must be made to prevent the infection of the other eye. The patient should lie only on the affected side; a shield may be put over the non-affected eye. If the patient is a girl, care must be taken not to infect the mucous membrane of the vagina. The hands should be restrained; it is advisable to keep the infant's arms pinned in a blanket constantly. The treatment consists in irrigating the eyes frequently enough to keep them free from pus. Owing to the copious discharge, this may have to be done every 10 to 20 minutes (see methods of irrigating eye). A special nurse is necessary. The use of cold is employed in the form of ice packs applied to the lids. These, too, may have to be changed at frequent intervals, as often as once every minute for 15 minutes out of every hour, or even oftener as the case may demand. Atropin sulphate may be ordered to keep the pupils dilated. Argyrol drops are used and sometimes silver nitrate. This is a serious condition and great emphasis must be put on the isolation of the child, especially in the institution, to prevent the spread of the disease. Expert nursing care is necessary and shows gratifying results. Great patience is demanded, for the disease may persist over a period of weeks. Although gonorrheal infection of the eyes usually manifests itself on the third or fourth day, there are many cases on record where it has developed later, after a week or 10 days. Any discharge

from the eyes of a newborn baby must be reported to the doctor at once so smears may be taken. Discharge from the eyes of whatever nature is reported to the State Board of Health. Gonorrheal infection must always be suspected and the baby must be isolated until it has been ruled out by repeated negative smears. It is quite common to see a more or less profuse, purulent discharge from the eyes of the newborn immediately after birth; this is due in some cases to the silver nitrate instilled at birth. It may, of course, be due to any of the pyogenic organisms and the condition should always be reported, the eyes should be kept clean by frequent irrigation, and the case should be isolated until the cause is determined.

Gonorrheal Vaginitis

Gonorrheal vaginitis occurs in newborn babies; like ophthalmia it is contracted from the mother at birth or soon after and manifests itself by profuse, purulent, vaginal discharge. Any vaginal discharge which may be noticed should be reported; gonorrheal infection should be suspected and the child isolated until repeated smears have proved negative. (See technique of treatment of vagina, Chapter XIX; also care of vaginitis under diseases of genito-urinary system.) The newborn baby girl often has a mucous vaginal discharge which is insignificant, but in order to rule out the possibility of a gonorrheal infection, it must be reported at once. Bloody vaginal discharge is not uncommon, usually only a few stains on the diaper, but this also must be reported.

Skin Infections of Newborn

The *skin* of the newborn is intensely red at first; this fades gradually to a healthy pink color by the end of a week. There may be desquamation for several days. In the care of the newborn, especially in the care of large numbers of babies in an institution, skin rashes of various types are too frequently seen. Very often these rashes are miliaria or "prickly heat." The use of cotton clothing prevents much of it. The most insignificant skin lesion noticed on a baby must be reported and such infectious conditions as impetigo contagiosa, syphilis, etc., must be ruled out. Isolation should be

carried out until a diagnosis is determined. Routine aseptic nursing care of the newborn will prevent much of the difficulty met with from skin lesions.

Inanition Temperature

An elevation of temperature occurs in a certain percentage of infants during the first few days of life before the mother's milk comes. It is believed that this elevation of temperature comes with peculiar frequency at the time when the weight is at the lowest point, and also in those infants whose weight loss is most marked, thus suggesting a close connection between the rise of temperature and the condition of starvation or inanition. The administration of food and the forcing of fluids cause the temperature to fall rapidly, proving that there is some definite relation between the taking of food and the fall of temperature.[2]

The hyperexcitability, increased reflexes, and slight flexor contracture of the extremities observed in most newborn babes are probably due to the incomplete development of the motor center of the cortex. This tremor has no significance and the mother who notices it and thinks that her baby is a particularly "nervous baby" should be reassured.

2. General and Nutritional Diseases.

Rickets

Rickets is a chronic disease of nutrition, affecting the bones most strikingly, but general in its nature and involving as well the ligaments, muscles, mucous membranes, nervous system, and other parts of the body. It is a very widely spread disease in all civilized countries, although its prevalence varies greatly with the locality and the season. It is almost universal among the poor in large cities and is less frequent generally during the summer months and in rural districts. The cause of rickets is still a matter of dispute, but recent investigations are proving that improper diet, lack of sunlight, and poor hygiene (see Heliotherapy, Chap-

[2] Grulee, C. G., M.D., and Bonar, B. E., M.D., "Some Observations on the So-Called Inanition Temperature of Newborns," *Am. J. Dis. Child.*, July, 1921.

ter XVII) are important predisposing factors. Therefore, a suitable diet, much direct sunlight, and the best possible hygienic living conditions are essential points in the prophylaxis as well as in the treatment of children with rickets.[3] These cannot be overemphasized. Cod liver oil is always given for rickets and is of unquestionable value in the prophylaxis and the cure of the disease.[4] Massage is employed to correct deformities and to strengthen feeble muscles; postural treatment also helps in a corrective way. Further development of deformities must be guarded against and properly regulated exercise which does not directly increase the deformity is to be encouraged. After the ossification of the bones operative treatment or special orthopedic procedures may be necessary to correct the deformities. (See Chapter XXIV.)

Scurvy

Scurvy is a nutritional disorder brought about by inadequacy of diet and falls in the group of so-called "deficiency diseases." It is characterized by anemia, loss of appetite, irritability, and later swelling of limbs, tenderness and severe constant pain, hemorrhages of the gums, subperiosteal hemorrhage, hematuria, and other hemorrhagic manifestations occur. The nursing care calls for correction of the diet to supply the necessary vitamins, the lack of which caused the disease; orange juice or the juice of some fresh fruit is always given. Good hygiene is a necessary part of the care. Because of the extreme tenderness and pain of the limbs, the child is hypersensitive and apprehensive, so that he will often scream through fear of being touched when any one approaches him. Gentle, skillful handling is important. Everything should be done for him at one time, and all procedures, as bathing, etc., must be made as brief as they can be, causing him as little discomfort as possible

[3] Powers, Park, McCollum, Simmons, "Prevention of Development of Rickets in Rats by Sunlight. Studies in Experimental Rickets," *Journ. Amer. Med. Assn.*, Jan. 31, 1922.

[4] "More About Cod Liver Oil in Therapy," *Journ. Amer. Med. Assn.*, Dec. 31, 1921.

while the acute symptoms last. As the weight of the bed-clothes on his body may increase the pain, a cradle may be put over him to support them.

Nutritional Disturbances of Infancy

Causes

The nutritional disturbances of infancy are caused by many factors seemingly non-related and which are difficult to correlate.[5] These causative factors are classified by Hess as follows:

1. *Overfeeding* of a well balanced dietary or of a single food element.
2. *Underfeeding,* either,
   a. Quantitatively, as in pyloric stenosis, or
   b. Qualitatively, by a poorly balanced diet or one lacking in proper proportion the essential food elements. (Including vitamin deficiency.)
3. *Secondary causes*
   a. Heat—with resulting systemic depression and often associated with spoiled food.
   b. Infection within the intestinal tract. (Dysentery, paratyphoid, etc.)
   c. Systemic parenteral infection. (Otitis media, pyelitis, pneumonia, etc.)
4. *Inherent abnormal metabolism,* causing disturbance by food qualitatively and quantitatively proper for a healthy infant. (Exudative diathesis, spasmophilia, etc.)

Various Classification

There is no generally accepted classification or terminology or the nutritional disturbances of infancy.[6] The older terminology spoke of dyspepsia (acute and chronic), catarrhal enteritis, ileocolitis, etc. This was an attempt at a pathological classification but was inadequate because the majority of nutritional disturbances show little if any

[5] Hess, Julius H., M.D., ''Principles and Practice of Infant Feeding.''
[6] Grulee, C. G., M.D., ''Infant Feeding.''
Hill and Gerstley, ''Clinical Lectures in Infant Feeding.''
Porter and Carter, ''Management of the Sick Infant.''

anatomical change at postmortem. Czerny and Keller formulated a classification based on etiology. This was an important contribution but its use is limited because the etiology of many of these conditions has not been clearly worked out and because it is a more or less cumbersome vehicle for the busy clinician. The classification of Finkelstein, while not accepted *in toto* to-day, still remains the simplest classification which at all answers the purpose. It is based entirely on clinical observation and divides these disturbances into syndromes, more or less clear cut, and each due to a rather wide variety of etiological factors. Finkelstein divides these conditions into the following types:

1. Disturbed metabolic balance (fat constipation, malnutrition, early atrophy).
2. Dyspepsia (sugar indigestion, fat indigestion).
3. Decomposition (marasmus, athrepsia, atrophy).
4. Intoxication (ileocolitis, catarrhal enteritis, summer diarrhea, cholera infantum).
5. Inanition (primary).

Disturbed Metabolic Balance

The first and second of these are the milder types, and reveal no destructive lesions at autopsy. The principal complaint in the first condition is failure to gain in weight. In dyspepsia the outstanding symptoms are diarrhea and failure to gain. A carefully made, accurate weight curve is of inestimable value in the regulation of these cases. Other than this they present no particular nursing problems beyond a scrupulous carrying out of the dietary prescribed. This will probably be breast milk if obtainable, otherwise malt soup, lactic acid milk, protein milk, or simpler whole milk dilutions. (See preparations of foods, Chapter XIII.) It must be remembered that these milder disturbances can go over quickly into the other, severe types.

Dyspepsia

Athrepsia

Decomposition or athrepsia[7] (the term popularized by Marriot) in a baby means an extremely sick patient who re-

[7] Marriot, Wm. McKim, M.D., "Some Phases of the Pathology of Nutrition in Infancy." *Journ. Amer. Med. Assn.*, Dec., 1920.

quires an unusual amount of intelligent conscientious nursing care. Skillful nursing is in fact an absolute requisite for a good prognosis and an appreciation of this should encourage the constant, often difficult care these patients require. The infant with athrepsia must have breast milk to survive. He is often too weak to suck and must be gavaged; extra fluids must be given him by mouth, also by other routes, as salt solution or glucose, intravenously, intraperitoneally, etc. He usually cannot maintain his own body heat, so if his temperature is subnormal he must be given routine premature care (see premature care, Chapter VIII) including the oil bath instead of a water bath, woolen clothes, and the application of heat to maintain an even, normal temperature. Like the premature, while he is very ill, he should be handled as little as possible, all nursing procedures being carried out at one time. He is very susceptible to infections, hence the great necessity for aseptic nursing care. He is subject to sudden collapse or sinking spells and must be carefully watched for symptoms of these. The cure of athrepsia usually takes several months and it is a well known fact that the child who has to stay in a hospital over such a long period will not continue to thrive in most cases. He is said to become "hospitalized" or "institutionalized." It is also a recognized fact that the child who is picked up and "played with" or handled a reasonable amount gains more rapidly than the child who is not. Therefore, as the infant's condition will permit, he should be picked up and "mothered" several times a day as part of his routine treatment. Intelligent mothering is good for the child, but it must not be foolish indulgence which will lead to the establishment of bad habits. Fresh air and sunlight are important factors in the care of the athreptic child; as his condition and the weather permit he should go outdoors daily. (See Heliotherapy, Chapter XVII.)

Intoxication Intoxication is another extremely grave condition in which

the clinical picture is one of collapse with fever, vomiting, diarrhea, and extreme loss of weight. The nervous symptoms are marked later, but when seen early the child is apathetic and drowsy, in contradistinction to athrepsia, where there is little sleep, the sensorium clear, and the patient fretful. The treatment will probably be initiated by a period of starvation during which glucose or saline will be given intravenously and saline solution intra-abdominally, subcutaneously, etc. The nursing care will be essentially the same as in athrepsia except that the fever present will call for tepid packs, sponges, or other methods of relieving nervous irritability and of reducing temperature.

Diabetes Mellitus

Diabetes mellitus does not occur as frequently in childhood as in adult life, but the prognosis is particularly poor when it does. The course of the disease is much more rapid than in adults. The treatment is the same, but usually the diet which will render the child's urine sugar free is far below his caloric requirements and the requirements for growth, or even for maintenance of life. He must, therefore, be kept in bed and as quiet as possible. He should be isolated also to remove from him the temptation of all forbidden food; he cannot understand the reason for his diet, and the child who was formerly the most truthful and honest will practice astonishing methods of deceit to obtain the food he craves. The most constant surveillance is therefore necessary. If he does obtain carbohydrate and exceed his tolerance, the carbohydrate mechanism becomes less and less capable and tolerance sinks, while the child's condition becomes more critical.

Acidosis

Acidosis is the condition in which the acid substances are present in the blood in a quantity relatively so increased that the normal excess of alkali is diminished. This occurs frequently in children and may accompany almost any illness in which there is a rapid or profuse loss of body fluid,

as from diarrhea or vomiting, or if the child goes without food or liquids for a short time. The treatment should be largely prophylactic. Whenever a child has excessive diarrhea or vomiting, liquids should be given him at once to make up the loss from the system. (See methods of giving fluids, Chapter XVII.) It is the fear of acidosis which prevents purgation of the child before operation (see preoperative care of children, Chapter XXIII) and it is the reason why he must be given fluids as soon as possible after operation. Whenever the condition is suspected an alkali, as sodium bicarbonate, may be given.

Rheumatism

Rheumatism can be roughly classified as acute or chronic. The latter is similar to chronic progressive polyarthritis of adult life and is often known as "Still's Disease" in childhood. It is fortunately not a common condition and the care of the patient is essentially an orthopedic problem. A much more common form, and more important because amenable to therapy, is acute rheumatic fever. This is usually ushered in with a high temperature and is soon accompanied by reddened, painful, and swollen joints. It may or may not follow an attack of tonsillitis. It is frequently associated with chorea and with cardiac complications. The important consideration from the nursing standpoint is prophylaxis. The etiology in the vast majority of cases is mouth infection, and the school nurse, particularly, will have abundant opportunity to teach proper hygiene and to lessen the frequency of this disease. Carious teeth, infected tonsils, or even the simple history of frequent attacks of tonsillitis demand proper medical attention.

In the care of the attack itself, the important items are:

1. Forcing of fluids (if no cardiac complications exist).
2. Protection and immobilization of the affected joints.
3. The insurance of absolute rest in bed.

The child should not be allowed to do anything for himself.

3. Diseases of the Digestive System.

Congenital Cleft of Lip or Palate

Congenital cleft lip and palate.

Classification

Group I.

Prealveolar (process) cleft (lip cleft—alveolar process normal).

(a) Unilateral.

(b) Bilateral.

(c) Median.

Group II.

Postalveolar (process) cleft (palate cleft—alveolar process normal).

(a) Soft palate.

(b) Hard palate.

Group III.

Alveolar (process) cleft.

(a) Unilateral.

1. Alveolar process.
2. Lip.
3. Palate.

(b) Bilateral.

1. Alveolar process.
2. Lip.
3. Palate.

(c) Median.

1. Alveolar process.
2. Lip.
3. Palate.

This classification is based on the following propositions:

1. Disuse of the term "hare lip."

2. Consideration of the subject from the standpoint of congenital clefts, thereby correlating all cases.

3. The alveolar process forms the foundation for a surgical grouping.

4. Development of generic surgical terms for the groups.

5. All anatomical descriptions subsidiary to these terms

which give the opportunity to describe alveolar process, lip, and palate separately.

Time of Operation

Time and sequence of operations.

Group I

Group I, from a surgical point of view, can be operated upon the first day or the first week or later in life with equal facility, but owing to the better control of the baby, it is advisable to do this as early as possible, say within the first month.

Group II

Group II demands much more of an operation than Group I. There is no reason for doing it until the baby begins to talk. Owing to the risk involved, it is suggested that the proper time for the operation is at 1 year, or when the baby is well established, or weighs about 15 pounds.

Group III

Group III demands that the closure of the alveolar process be done as early as possible, surely before the baby is 3 weeks old. Otherwise the line of the face becomes fixed and as he grows older this closure is accomplished with increasing difficulty. It is within the judgment of the operator in this group to select whether the process shall be first brought together with a wire and plates, or whether the first repair of the lip will accomplish this necessary step. Therefore the surgeon selected should have the opportunity of decision as early in the baby's life as it is possible to have him see the case.

(This classification has recently been made by Dr. H. Ritchie of St. Paul, Minnesota, who has kindly contributed the above.)

Importance of Recognition of Groups by Nurse

Since the only treatment of the above conditions is surgical, it is essential that the nurse be able to recognize the different groups and know when surgical treatment should be started. Before the baby is ready for surgery, whatever group he may be in, he should be in the best possible condition. As a result of the malformation he usually has more or less difficulty in nursing and may be suffering from malnutrition.

To Prepare for Surgical Treatment

He needs several weeks of the very best aseptic nursing care to improve his general condition so that he will

be able to stand surgery. Since the baby with an alveolar cleft or cleft lip has to be gavaged after operation, it is advisable to begin to feed him this way before operation. Experience has shown that it is the most satisfactory method.

Postoperative Care of Child with Cleft Lip

Postoperative care of child with congenital cleft of lip or palate: The baby with cleft lip is usually operated on during the early days or weeks of life. After operation he must be kept reasonably quiet. Since crying is a strain on the tissues of the lip, it should be reported to the surgeon. A sedative, as chloral hydrate, may be ordered. The child's hands must be restrained to keep him from rubbing his lip or sucking his fingers. Cuffs should be worn over his arms and it is wise to take the added precaution of tying his hands to the sides of the crib. The lip should be kept as clean as possible. Some surgeons do not wish the nurse to clean the lip, so this is done only when ordered. The tray to clean a postoperative cleft lip should contain:

Restrain Hands

Postoperative Tray

Jar of sterile gauze pledgets.
Jar of toothpick applicators, sterile.
Paper bag for waste.
Pair of handling forceps in 5 per cent lysol solution.
Tube of sterile vaselin.
Jar of antiseptic solution as ordered to clean the lip.

$$\left.\begin{array}{l}\text{One-half 4 per cent boric acid}\\ \quad\text{solution}\\ \text{One-half 70 per cent alcohol}\end{array}\right\}\ \begin{array}{l}\text{May be used unless}\\ \text{otherwise ordered.}\end{array}$$

To Clean Lip

With the sterile handling forceps remove a gauze pledget from the jar and dip it into the solution and with it gently pat the lip clean; do not rub it. Toothpick applicators which are dipped in the antiseptic are used to clean the nostrils. Extreme care must be taken in cleaning the lip after it has been repaired.

Feeding

The feeding and method of feeding must be established before the operation so that the child will be accustomed to it, and the same food and method are continued afterwards. The baby with a lip that has just been operated on cannot

nurse either his mother's breast or a nipple. His mother should express her milk, which is given to him by gavage. This method saves all strain on the lip and allows the baby's mouth to be kept as clean as possible. After the gavage tube is removed put 15 to 30 c.c. of sterile water into the baby's mouth with a sterile medicine dropper, the end of which should be protected with a rubber tube.

Post-operative Care of Child with Cleft Palate

The child with cleft palate is usually operated on after he is a year old. He, too, should be kept quiet and should not be allowed to strain his stitches by talking or crying. In order to prevent him from injuring his wound, his hands must be restrained by cuffs and by tying if necessary. The usual routine is to feed him sterile liquids with a sterile spoon for at least 10 days after operation. Follow all food with 15 to 30 c.c. of sterile water. This liquid diet will not give him adequate food. He should have nourishment every 2 hours and all liquids should be made as concentrated and as nourishing as possible by the addition of carbohydrate. Since his food is not sufficient for his needs, he must be kept in bed as quietly as possible during the time he is taking only liquids and after that time until he has regained his weight.

Restrain Hands

Feeding

Oral Hygiene

Orál hygiene as already discussed under the care of the mouth and teeth (Chapter VI) must be preached by the nurse wherever she may be and she holds it in her power to do much missionary work along this line. Dental caries is universal in its distribution, but is essentially a disease of childhood. Most of the conditions which require the attention of the dentist in adult life have had their origin in childhood.[8] Recent investigations furnish abundant proof of the fact that the sordes which causes dental caries may also be the cause of cardiac disease, acute rheumatism, mental backwardness, malnutrition, and a host of other evils. Since babyhood and adolescence are the periods of greatest susceptibility to dental caries, the prevention of them becomes a matter of vital importance for the health of the child.

Importance of Oral Hygiene

[8] Fones, Alfred, D.D.S., "Mouth Hygiene."

While scrubbing of the teeth is essential, it alone cannot prevent their decay. Proper diet is another necessary prophylactic measure. This consists:

1. In the elimination of sugars, as candy, between meals, and in the elimination of excess sugar with meals.

2. In the elimination of an excess of the finely ground white flour foods, and in the substitution of coarser foods.

3. In the introduction of roughage which scours and cleanses the teeth, as for example, rye crisp, celery.

4. In the introduction of foods which require mastication to develop the function of the teeth, to develop the jaws and the salivary glands.

(Approved by Dental Department, University of Minnesota.)

Stomatitis of various types calls for cleanliness of the mouth (see mouth wash, Chapter VI). The young child who cannot understand how to rinse his mouth will have to have medications applied with a swab or by irrigations (see method, Chapter XIX). Potassium chlorate is considered a specific remedy for ulcerative stomatitis and is usually used. Any swabbing of the mouth or application of medications must be done very gently because of the extreme soreness. **Stomatitis**

Thrush is a parasitic form of stomatitis characterized by the appearance upon the mucous membrane, usually of the tongue and cheeks, of small white flakes and large white patches. It occurs most frequently (1) in infants suffering from protracted, exhausting diseases, (2) in infants with deformities of the mouth, as alveolar cleft, and (3) among sick or poorly nourished infants crowded together in institutions under poor hygienic conditions. It does not develop on healthy mucous membrane. An abrasion, such as may be caused by frequent or careless cleaning of the baby's mouth, offers a favorable field for the growth of thrush. The infection spreads from one child to another unless careful isolation is observed The nursing care is largely prophylactic. It can be avoided to a certain extent (1) if the mucous **Thrush**

membrane is not injured by cleaning it; (2) if aseptic nursing care is practiced; and (3) if all nipples and bottles are sterilized after use. There are various treatments used for thrush. Medications should not be applied with a swab since they only increase the danger of injury to the mucous membrane and prolong the infection. After nursing, sterile water, 15 to 30 c.c., may be dropped into the child's mouth with a medicine dropper, the tip of which is protected by a rubber. Any medication is best made in the same way. Irritation caused by sucking the nipple may prolong the disease; it may also cause so much pain that the baby will refuse to suck. He often has to be gavaged unless there seems to be danger of spreading the disease down the esophagus by the passage of the tube.

Retropharyngeal Abscess

Retropharyngeal abscess is quite common in children. It is characterized by difficulty in swallowing, noisy, difficult respirations and mouth breathing; the head may be drawn backward. Before the abscess is opened there is always danger that it may break and that the child may be choked by the purulent discharge, or that he may inhale it. He must be carefully watched for this, and if his dyspnea will permit, he should lie on his face with a pillow under the chest to make his head lower than his shoulders and facilitate drainage from the nose and mouth in case the abscess does erupt. This position must always be assumed after operation to aid drainage. The child can be restrained if necessary. Swallowing is difficult, often impossible before the abscess is opened, afterwards there is little difficulty in the usual case.

Adenoidal Growths

Adenoidal growths whenever noticed by the nurse must be reported and arrangements must be made for their removal. This is another splendid opportunity which the nurse has to influence and educate the public and to do constructive prophylactic work. She should be able to recognize the child with adenoidal growths by the so-called adenoid facies, the mouth breathing or sometimes simply by the history of repeated "colds."

Tonsillitis calls for isolation of the patient. In fact whenever a child has a sore throat he should be isolated, since that symptom ushers in so many contagious diseases. Throat cultures should be taken because of the possibility of diphtheria. The child should be kept quietly in bed, should be given a fluid or semi-solid diet, and his fluid intake should be forced. Local applications, either hot or cold, may give relief. An astringent gargle may be ordered if he is old enough to gargle, if not, an irrigation of the mouth may take its place. A cleansing spray may be used. Removal of the tonsils should be advised if the child has hypertrophied tonsils or recurrent attacks of tonsillitis. After tonsillectomy he should be kept in a lateral or ventral position and should be turned frequently. He should be kept absolutely quiet for 3 days to prevent hemorrhage. It is advisable, however, to keep him in bed for a week. **Tonsillitis**

Cicatricial stricture of esophagus in the child occurs very frequently and is caused by the accidental swallowing of a caustic solution, such as lye.[9] The immediate treatment consists in giving the child dilute acid drinks, as lemon juice or vinegar. Do not pass a gavage tube, since it may cause a perforation of the corroded wall of the stomach or esophagus. Medical aid must be called quickly. General measures, such as stimulants, warmth, etc., are taken.[10] Often the child dies at once from the irritant poison, acute inflammation, burns, sloughing, perforation, etc. If these do not occur he gradually improves. The healing of the burns by granulation and cicatrization takes place, the contraction of the cicatrix gradually narrowing the lumen of the esophagus until a stricture is produced. It is usually several weeks or months (sometimes years) after the original trouble before the symptoms of stricture begin. There is an increasing difficulty experienced in swallowing solid food, which often is regurgitated after **Stricture of Esophagus** **Cause** **Immediate Treatment** **Cicatrix Causes Stricture** **Symptoms**

[9] Jackson, Chevalier, M.D., "Esophageal Stenosis Following the Swallowing of Caustic Alkali." *Journ. Amer. Med. Assn.*, July 21, 1921.

[10] Cushney, Arthur, M.D., "Pharmacology and Therapeutics."

the attempt is made, and finally even liquids are regurgitated. The child becomes much emaciated, often almost moribund, from starvation. The treatment in such cases is surgical and usually consists in a systematic and careful use of bougies of a progressively increasing size. Sometimes gastrotomy becomes necessary to save life. Food may be given by rectum, but the child's rectum will not tolerate long continued rectal feedings. Fluids may be given in other ways, by hypodermoclysis, by intravenous and by intraperitoneal routes. After the dilatations the child usually takes liquid food or solid food by mouth, if well masticated, with more or less success. Such children should be given as concentrated food as possible every hour or two. They should be kept in bed to conserve energy and they may need external heat and extra warm clothing to maintain normal body temperature. The cure takes many months of patient, persistent treatment. The very best rules of hygiene must be carried out to aid recovery. Often, as the child begins to recover, the vomiting of food may become more or less psychic, for he has acquired the habit of regurgitating most of his food. If this is believed to be the case, do not give him a basin in which to vomit and assume that there is no possibility of his doing so. This psychic vomiting may cause as much difficulty and be quite as hard to overcome as the original trouble.

Treatment **Nursing Care**

Pyloric Stenosis

Pyloric stenosis is a congenital hypertrophic stenosis of the pylorus. It usually manifests itself in infants from 2 to 8 weeks of age, and occurs more often in the child who previously has had no signs of gastric disorder and more frequently in the male than in the female child. The disease is characterized by vomiting, which is very forceful and projectile in type. It may occur directly after the taking of food or several hours later, and the amount vomited is often more than that just taken in. There is progressive loss of weight, the stools are starvation stools, and the urine is scanty. The treatment is (1) medical or (2) surgical. Usually, (1) medical treatment is tried first. This consists of

Symptoms **Treatment**

lavage before feedings, followed by gavage. The food is usually breast milk or a thick cereal mixture which must be so thick that it will stick to an inverted spoon. (See rules for preparing, Chapter XIII.) [11] To be successful the medical therapy must be carried out with all faithfulness to detail. The baby is in poor condition and needs expert nursing care. He often has to be treated as a premature. Fluids are given

Medical Treatment

Nursing Care

FIGURE 45. METHOD OF FEFDING THICK CEREAL THROUGH A HYGEIA NIPPLE

him in other ways besides by mouth (see methods described, Chapter XVII). He should lie on his right side to favor the passage of food through the pylorus. Relief of the condition by medical treatment may take many months of the most patient, exacting nursing care. Clinical opinion varies widely on the length of time that medical therapy should be followed. (2) Surgical treatment usually consists in the per-

Surgical Treatment

[11] Sauer, L. W., M.D., "Use of Thick Cereal in the Treatment of Pyloric Stenosis." *Arch. Ped.*, July, 1918.

"Further Contribution to the Study of Pyloric Stenosis." *Am. J. Dis. Child.*, Aug., 1921.

forming of the Ramstadt operation.[12] The preoperative care outlined under surgical care of children is followed (Chapter XXIII). The postoperative nursing care is practically the same as that demanded by medical treatment before operation. Breast milk is essential and is given as ordered, usually as soon as the effect of the anesthetic has passed.

Regurgitation

Vomiting (Griffith) is a frequent symptom in early life which is due to varied causes. Simple regurgitation, without effort, of food which is little changed, if any, occurs in the case of healthy infants who have taken more milk than they can comfortably hold, or who have been carelessly handled after feeding. True vomiting is accompanied by more effort and by evidences of nausea, such as pallor of the face and perspiration. It is very common at the beginning of (1) acute febrile diseases in early life. When acute and of brief duration, accompanied by nausea and coated tongue, and perhaps followed by diarrhea, it is generally the sign of (2) acute gastro-intestinal disturbance. Very obstinate vomiting, frequently with much mucus, occurs in (3) chronic gastric indigestion and gastritis in infancy and in cases of stenosis of pylorus. Vomiting may be the evidence of a (4) toxic state, as seen, for instance, in uremia and acute milk poisoning. If repeated frequently for days, and attended by retracted abdomen, headache, moderate fever, and some degree of constipation, it is very suggestive of (5) meningitis, or, in the absence of fever, (6) of brain tumor. (7) Recurrent vomiting is a disorder not to be forgotten. Vomiting is (8) common with paroxysms of coughing, especially in pertussis and severe bronchitis. Very obstinate vomiting with distention of the abdomen and some degree of constipation occurs in (9) peritonitis. When obstinate

[12] Kerley, C. G., M.D., "Ramstadt Operation." *Journ. Amer. Med. Assn.*, Jan. 14, 1919.

Goldbloom, Alton, M.D., and Spence, Ralph C., M.D., "Prognosis in Operated Cases of Hypertrophic Stenosis of the Pylorus." *Am. J. Dis. Child.*, April, 1920.

constipation is combined with obstinate vomiting the existence of (10) obstruction of the bowels, sometimes congenital, may be suspected. The extreme ease with which vomiting is brought about in infants and children must be borne in mind. This is especially true when once the tendency to vomit has been developed. Thus, in many infants, slight moving of the body after a meal is sufficient to cause the loss of it. The mere taste of food may occasion vomiting, both in infants and in older children, everything being ejected the taste of which is not liked. This is probably the reason why nourishment given to infants by gavage may be retained when that entering the mouth in the usual way may be vomited. A child can, with sufficient practice, vomit whenever he desires, and he will often use this power to produce a desired reaction from his mother.

Rumination

Rumination is habit vomiting; after taking milk the infant immediately regurgitates without any effort, spits out some, holds some in his mouth, and after going through a chewing process with it re-swallows it; he does this constantly, regurgitating his milk and re-swallowing it. Thick cereal feeding is often given, since it cannot be readily regurgitated. This is the only condition in which a pacifier is ever indicated; here occasionally it helps, for the child constantly sucking a pacifier will forget to ruminate. Another device to prevent ruminating is the use of a 4-tailed bandage of the jaw, or a specially designed mask to hold the mouth shut and immobilize the lower jaw.[13]

Swallowing of Foreign Bodies

The *swallowing* of foreign bodies is common in childhood. The child of almost any age may have more or less of a habit of putting objects into his mouth. Careful training will overcome the habit to a great extent and should be emphasized because of the danger of swallowing such objects. The size and shape of the foreign body swallowed largely determines the result. Symptoms are indefinite and vary according to

[13] Kerley, C. G., M.D., and Lorenz, E. J., M.D., "Failure to Gain; Rumination." *Arch. Ped.*, May, 1921.

conditions. It may lodge in the esophagus and the removal of it is a surgical procedure. It may pass into the stomach and remain there for a varying length of time, or it may pass directly into the intestines and be expelled without event. An x-ray will determine its progress. Whenever it is known that a child has swallowed a foreign body a physician should be called to determine the seriousness of it. Efforts should be made to aid the exit of the body and to protect the gastric mucous membrane. This is best accomplished by the administration of abundant food which will coat the object, such as potatoes, bread or cereals. No purgatives or emetics should be given. Surgery is the last resort if other measures fail.

Diarrhea

Diarrhea like vomiting is only a symptom, but is of such importance that the nurse must have some knowledge of it.

Significance in Children

It is one of the most frequent and often the most serious of the disorders of childhood, and especially of infancy. Over 25 per cent of the deaths of children under 10 years old are due to diarrhea from one cause or another. It is seen more frequently in summer than in winter. It may be due to (Griffith):

Causes

1. Irritation of the gastro-intestinal tract by:
    a. Improper food.
    b. Drugs, etc.
2. Toxic origin, acute gastro-enteric intoxication.
3. Nervous origin.
    a. Hot weather.
    b. Chilling of body.
    c. Emotional excitement.
    d. Fatigue—and a variety of like causes.
4. Acute intestinal indigestion—functional disturbance of the intestine.
5. Metabolic origin—acute infectious diseases, parenteral infections.
6. Inflammatory origin—ileocolitis, tuberculous enteritis.

It is a matter of concern when any child has frequent watery

stools, and if they persist over 24 hours a physician should be called to determine the cause.

Acute Intestinal Indigestion

Acute intestinal indigestion occurs in a mild form and if untreated develops into the severe type known as cholera infantum or the ''intoxication'' of Finkelstein. It occurs more frequently in summer than in winter. The treatment is first prophylactic. If the child who begins to vomit or to have diarrhea is taken at once to a physician much grief can be avoided. The nursing care of the child with intestinal indigestion calls for hygiene, proper regulation of the diet, and correction of the dehydration. He should be kept outdoors as much as possible. The city child should be taken to the country if possible.

Ileocolitis (dysentery, enterocolitis, enteritis, inflammatory diarrhea) is a pathologic process seen more frequently in summer months and in the warmer climates. It occurs most often in children under 2 years old. Proper hygiene, fresh air, and regulation of the diet are essential. Forcing of fluids in various ways is necessary. A change of air is advisable. Isolation must be carefully carried out for the disease is highly infectious, especially among children in institutions.

Chronic Intestinal Indigestion

Chronic intestinal indigestion, often called celiac disease, or Hürter's infantilism, occurs most frequently in children from 1 to 5 years and in children in the middle or upper classes. The disease is usually characterized by the child's intolerance for carbohydrate and fat, thus making the diet largely protein. The stool is very characteristic, almost pathognomonic. It is extremely large, foul, unformed, greasy, and almost colorless. The nursing care consists in carrying out a carefully regulated diet to suit the tolerance of the child, hygienic care, general management and training. There are frequent discouraging relapses and the same careful treatment has to be continued over a period of years. There is a marked dilatation of both the large and the small intestine. A firm, well fitting abdominal binder often gives relief.

Colic

Colic is the term applied to paroxysmal pain in the intestines from various causes.[14] It is essentially a symptom of indigestion, and is often associated with flatulence, sometimes with constipation. Colic of infancy is caused by spasm of the muscular wall of the intestines, and is usually due to (1) too much food, (2) too frequent feeding, (3) improper food. Gas or flatulence which accompanies colic may be prevented to a certain extent in both bottle fed and breast fed babies: if the child is raised to a sitting posture several times during the nursing and is gently patted on the back until the gas is belched. Relief is sometimes obtained if the baby with colic is allowed to lie on his face with a hot water bottle (115° F.) under his abdomen. A saline or plain water enema may also give relief by starting peristalsis and causing expulsion of gas.

Hirschsprung's Disease

Hirschsprung's disease, or congenital enlargement of the colon demands no special pediatric nursing care except the constant struggle with severe constipation, which means repeated enemata, drugs, diet, etc. (See treatment of constipation.) Surgery is sometimes employed.

Intussusception

Intussusception is a disease of childhood. Whenever a child has severe abdominal pain, vomiting, and bloody mucous stools, this condition should be suspected. Unless operation is performed within a few hours, the prognosis is extremely poor. The nursing care involves no special technique beyond that of other postoperative abdominal conditions. The important part is to recognize the symptoms early so that the child may be operated on at once.

Hernia

Hernia:

Umbilical Hernia

Adhesive Strap

1. *Umbilical hernia* is either congenital or acquired. The acquired type occasionally results after the separation of the cord. The condition is usually remedied by an adhesive strap 2½ inches by 6 or 8 inches. This is drawn tensely, is applied, and is fastened over the ribs on both sides so that

[14] Grulee, C. G., M.D., ''Treatment of Colic in Breast Fed Infants.'' *Journ. Amer. Med. Assn.,* Dec. 18, 1920.

a longitudinal fold of the abdominal wall is drawn over the hernia. This may have to be used for several months. The adhesive should be changed every week or 10 days and the skin should be cleaned with benzin. If the skin is much irritated, it may be necessary to apply sterile gauze over the irritated places and to make the adhesive strip longer, thus relieving tension in any one place.

Inguinal Hernia

2. *Inguinal hernia* is congenital or acquired. It is often treated by means of a yarn truss. A skein of soft woolen yarn of the proper length is passed around the body just above the iliac crests, and a slip noose formed in front so that the knot comes directly over the external inguinal ring. The free end is then passed between the thighs and along the line of the gluteal fold and is tied or pinned behind and somewhat to one side. The truss may be protected from the discharges by means of a piece of oiled muslin rolled around the yarn where it passes between the thighs. Several skeins of yarn should always be on hand so that the soiled one may be removed and replaced. These should be worn night and day for several months at least. Before the truss is applied the hernia should be carefully reduced. This can usually be done with the child in a recumbent position, the pelvis being somewhat elevated and the thighs being flexed on the abdomen. If the hernia cannot be reduced readily and if there are signs of strangulation, as evidenced by pain or shock, a physician should be summoned at once as surgical intervention may be necessary.[15]

Postoperative Care of Hernia

Postoperative care of hernia: The small child who has not yet learned to express his desires to go to the toilet and who is still wearing a diaper often has to be operated on for hernia. This means that his wound will be constantly saturated with urine. To prevent this the following dressing is applied:

The hernia wound is covered with a thick collodion dressing in the operating room and no other dressing and no

[15] Ramsey, W. R., M.D., "Care and Feeding of Children."

abdominal binder are put on. When the child returns to his bed, a restrainer is put on him to keep him flat on his back and a small cradle is placed over his body. His legs are tied to the cradle on either side with a piece of bandage. His nightgown is brought up over the cradle and is pinned to it on all sides with safety pins so that he cannot get his hands under it to touch his wound. If he is particularly active or naughty, his hands may have to be tied also. A diaper is placed under his buttocks but not brought up around his body to fasten it. It is changed whenever it is wet or soiled. With this arrangement the child's abdomen is kept entirely uncovered and exposed and nothing touches it to infect it. He should be picked up, keeping him in a recumbent position, several times daily to change his position. The scrotum is often edematous after operation, causing considerable discomfort. Relief may be obtained by supporting it in a sling made of a diaper placed under it and pinned up to the sides of the cradle.

Appendicitis and *peritonitis* in children are usually treated by surgery. After operation the child may be ordered on a back rest or in Fowler's position to aid drainage (see directions for adjusting head rest, knee roll, etc., Chapter V). He may be too little to understand that he should maintain this position or he may be delirious or too sick to be reasoned with. He may also remove his dressings or may pick at his wound. In such a case a special nurse is necessary. Even if he is under constant surveillance restraints may often be necessary. It is better to avoid them if possible. After any abdominal operation there may be difficulty with the small child who may soil his dressings with urine or feces. This necessitates some arrangement similar to the one described above for postoperative care of hernia. The details have to be decided for every separate case, as the difficulties present themselves. If the child's condition will permit, he may be strapped to a Bradford frame with his buttocks over the opening in the canvas and a tube over his genitals to

collect the urine and convey it to a bottle at the side of the crib. (See method for collecting 24-hour urine specimen, Chapter XV.)

Intestinal Parasites

Intestinal parasites or worms do occur in childhood but do not occur nearly as frequently as the laity believe.

Ascaris Lumbricoides

1. *Ascaris lumbricoides* or round worms are the most common intestinal parasites found in children in this country. They often cause no symptoms. Sometimes there are signs of digestive disturbance, restlessness, irritability, tympanites, colic, gritting of the teeth, picking of the nose, and various nervous manifestations. Their presence is determined only by the actual finding of the worms or ova in the stools. They occur often enough for the nurse to consider them a possibility whenever a child first comes under her observation and she should examine the stools closely. The treatment consists in a short period of starvation, the administration of a vermifuge, as santonin followed by some cathartic. This may have to be repeated in 2 weeks.

Oxyuris Vermicularis

2. *Oxyuris vermicularis* or pin worms are frequently found in children. They cause severe itching around the anus, usually worse at night. They may be observed in the stools, around the anus, and occasionally around the genitals. The treatment calls for daily rectal irrigations. Infusion of quassia is a favorite remedy. Some vermifuge, as santonin, is given by mouth. The child's anus and genitals must be kept clean and are sponged with an antiseptic, as bichlorid of mercury, every 2 to 4 hours and after a defecation. Some soothing ointment may be applied to the anus to relieve the irritation. The clothing, including night clothes and bedding, should be changed daily. The disease is contagious and the child in the home or in the institution should be isolated from others. He may also reinfect himself unless his hands are restrained so that they cannot come in contact with the anus.

Tænia Saginata

3. *Tænia saginata* is the most common type of tapeworm found in children. There may be no symptoms or there may

be vague digestive disturbances. The diagnosis is made only after finding segments of the worm in the stools. The treatment consists of a short period of starvation, a rectal irrigation, and a saline purgative, followed by some vermifuge. Male fern or pumpkin seed are common remedies. Another purgative is given in an hour or two after the administration of the vermifuge. When the child is about to have a defecation it is suggested that he be seated on a vessel full of water so that his buttocks are in contact with the fluid. The water will help support the worm while it is being expelled and there seems less danger of the head breaking off. Children stand catharsis very poorly and the treatment for these above conditions, especially for tænia saginata, is particularly exhausting and should not be started unless the child is in good physical condition. He should be kept quietly in bed for a few days before the treatment is started, while it is being given, and afterwards until he has regained his strength and weight.

Prolapse of Rectum

Prolapse of the rectum is common in children, occurring usually with the act of defecation. It can be easily reduced in most cases by laying the child on his face with his hips elevated, and by making gentle pressure upon the tumor with oiled fingers. A glove should be worn when doing this. The application of cold, either of ice or cold cloths is of assistance oftentimes. An adhesive strip, 2 or 3 inches wide strapped tightly across the rectum over the buttocks, helps to prevent prolapse. The child should lie quietly on his back for at least an hour after the reduction of the prolapse, and his activities should be restrained for a period of weeks to prevent recurrence. Straining at stool should be avoided by regulation of the diet, non-irritant laxatives, and suppositories. Operation is sometimes necessary.

Constipation

Cause

Constipation is usually due to:

1. Habit.
    a. Lack of proper training in regular toilet habits.

2. Faulty diet.
    a. Improper balance of food principles.
    b. Too little food from (1) excessive vomiting or (2) underfeeding.
    c. Irregular habits of eating.
3. Abuse of cathartics.
4. Anomalies of the gastro-intestinal tract.
5. Constitutional disease.

Prevention The healthy child trained in infancy to regular habits of eating and regular times for defecations will have little difficulty with constipation as he grows older (Chapter XV). Occasionally a baby will have only one stool a day or maybe one every other day. If this stool is copious and normal in character and if the baby is thriving, there is no cause to worry. It is best to interfere as little as possible because this interference produces a habit and chronic constipation may result.

Breast Fed Baby The breast fed baby is seldom troubled with constipation, if he has regular feeding hours and if he is trained to regular habits of defecation. Constipation of the mother and irregularity of her habits may produce constipation in the baby.

Artificially Fed Baby The artificially fed baby is more subject to constipation. Normally he has fewer stools in 24 hours and they are firmer and more formed than those of the breast fed baby. **Treatment** To treat constipation in a baby (1) he should be trained to regular habits at once; (2) the diet should be regulated and the proper balance of food principles should be brought about; (3) he should have plenty of water. A small baby can take 30 to 60 c.c. of boiled water 2 or 3 times daily halfway between feedings. This is increased as he grows older until, by the time he is a year old, he may have 180 to 240 c.c. several times a day between meals. (4) Fruit juices are beneficial. A baby over 6 weeks can generally have prune juice, starting with 1 dram once a day, diluted half with water, and gradually increasing so that in a few weeks he is having ½ to 1 ounce twice a day, diluted half with water. (5) Massage

of the abdomen will sometimes help. It should be given for 10 minutes twice a day.

Child

Irregular habits are the greatest single cause of constipation in the older child. The condition here, together with that found in constitutional disease and anomalies of the gastro-intestinal tract is usually due to an atonia of the musculature of the colon. A faulty dietary and the abuse of cathartics on the other hand results usually in hypertonicity of the intestinal musculature. Therefore, the two general conditions are approached differently. It can be said with safety, however, that the modern tendency in the treatment of constipation is away from reliance on drug therapy toward the attempt at correction of the underlying cause. (1) Regular times to go to the toilet cannot be overemphasized. Often constipation is the result of the child not taking time to go to the toilet. He should be taught to go soon after breakfast, and this meal should be early enough to allow him ample time before his day's activities begin. If he realizes from the start that he has to stay in the toilet until he has a stool, he will soon form the habit of having one at this time. (2) Regulation of the diet is necessary. Coarse cereals, coarse breads, vegetables with a good deal of fiber, and fruits are essential at meal hours. Agar-agar jelly is beneficial (see rules for making, Chapter XIII.) (3) Water between meals should be given and a glass of either hot or cold water before breakfast is helpful. (4) Massage of the abdomen may be employed. (5) Well rounded exercise is necessary, especially exercises which tend to develop the abdominal muscles. (6) Proper posture should be established. Enemata should not be employed regularly. Occasionally an enema is necessary for immediate relief when the bowels have not moved for a day or two. Suppositories, as a gluten suppository or soap stick, are helpful to irritate the lower bowel, at times, to produce a stool. Neither enemata nor suppositories will cure constipation and if they are to be resorted to their use should be alternated, so that the constant use of one

Treatment

or the other will not produce a habit. Drugs are the last resort and they are given only if ordered. Castor oil is never given for constipation. Liquid petrolatum (liquid albolene, Russian oil, mineral oil) which is given several times a day will help by increasing the bulk of the intestinal contents and by acting as a lubricant. It is not absorbed and has no systemic action. The dose should be gradually decreased as the desired results are obtained. Milk of magnesia or cascara sagrada may be ordered. They are usually given in small doses several times a day and the dose is gradually decreased.

4. Diseases of the Respiratory System.

Diseases of the respiratory system are among the commonest of the disorders of early life, being exceeded in infancy only by digestive disturbances and in early childhood even surpassing these in number.

Coughing (Griffith) is an important respiratory symptom. **Coughing** There are different types. A short suppressed cough followed by a facial expression of pain is observed in pneumonia and pleurisy; a peculiar barking, brazen cough in spasmodic croup or the early stage of laryngeal diphtheria; a tight, hoarse cough in laryngitis and tracheitis. Long hard paroxysms of dry coughing, sometimes causing pain in the chest, occur in the early stages of severe bronchitis, and a loose rattling cough in bronchitis after secretions have been established. The long paroxysms of rapid, short, expiratory efforts, continuing until suffocation seems impending and followed by a crowing inspiration, are characteristic of pertussis. A peculiarly severe, ringing, brazen cough, in some respects resembling that of croup but often paroxysmal, is sometimes caused by the presence of glandular or other tumors or abscesses within the thorax, or by the presence of a foreign body in the wind pipe. An annoying "tickling," or hacking cough occurs in pharyngitis. When the pharyngitis is severe the cough causes pain in the throat. A hard dry cough, often

severe, is heard in passive congestion of the lungs produced by disease of the heart. Indigestion is frequently attended by a hacking cough, the so-called "stomach cough." Asthma has a short dry cough, not paroxysmal. Voluntary expectoration of sputum following coughing does not, as a rule, take place in any disease until the child is 6 or 7 years old. Sputum for examination may be obtained by introducing a catheter or a cotton applicator to the base of the tongue. This irritation causes coughing and sputum may be aspirated by the catheter or caught on the applicator. Most every type of cough is exaggerated at night. The treatment depends on the cause. Drugs as sedatives or expectorants are sometimes necessary. A variety of "home remedies," as syrups, etc., to relieve the irritation are usually given, with varying success. Cold applications to the throat may help, also steam inhalations or a croup tent are sometimes beneficial. (See method of giving, Chapter XVIII.)

To Obtain Sputum

Epistaxis

Epistaxis occurs frequently in children; it is often seen in nasal diphtheria and may be an early symptom of some other infectious disease. Repeated epistaxis without other symptoms is usually due to the fact that the child picks his nose or to the presence of a foreign body. Any child who picks his nose or has a habit of introducing objects into the nostrils should be broken of the habit. The immediate treatment to check the hemorrhage consists in compressing the nose between the thumb and finger. Ice may be applied over the nose and sometimes small pieces of ice may be introduced into the nostrils or may be held in the mouth. Cold applications can be put on the back of the neck. If the hemorrhage persists, a physician should be called; it may be necessary to plug the anterior nares and sometimes the posterior nares as well. Further treatment consists in hygienic and general tonic measures.

Upper Respiratory Infections

Upper respiratory diseases occur too frequently in children. A child who "takes cold" repeatedly should have a thorough medical examination. All his habits, as of eating, sleeping,

exercise, time out-of-doors, and clothing should be carefully looked into and mistakes should be remedied. He should have the benefit of hygienic surroundings and proper modes of living. He should be outdoors as much as possible, and should sleep in a well ventilated room with a moderate amount of covering. Cold sponging of the chest or cold showers are helpful. His clothing should be heavy enough to protect him, but not too heavy; it will be governed entirely by the circumstances, as the heating system of the home and the climate. Upper respiratory infections spread rapidly among children in an institution. This is especially true of sick infants, who are very susceptible to them. What seems to be a simple cold often quickly develops into otitis media, bronchitis, or pneumonia; even death may result. Therefore, all children suffering from even the mildest infections should be carefully isolated. Many such infections can be avoided if nurses, doctors, and others working with the children wear masks over the nose and mouth if they themselves are suffering from upper respiratory infections, or better yet, if they stay away from the children entirely. When treating an infant with coryza, the general rules of hygiene should be observed; his nose should be cleaned out frequently, at least every two hours, to help him to breathe and to nurse. Warm oil, as liquid petrolatum, dropped into the nostrils is helpful.

Spasmodic laryngitis or croup is frequent in children from 6 months to 3 years old, occurring more often in the well nourished child. The attack always comes at night. The child seems as usual during the day except for a little hoarsenes and cough or possible coryza or slight fever toward evening. These symptoms increase until about midnight when the child has an attack of croup. The treatment consists in giving an emetic, since vomiting from any cause will relieve laryngeal spasms. Syrup of ipecac is most commonly used for this purpose. An enema is given if the child is constipated. Antipyrin in suitable doses is usually ordered **Croup**

as a prophylaxis. Steam inhalations or a croup tent are valuable remedies. (See croup tent, Chapter XVIII.) Warm or cold applications over the larynx help. The child should be kept indoors for several days after an attack; the attacks are apt to be repeated for several consecutive nights. Prophylactic treatment consists in giving the child general tonic and hygienic treatment and plenty of fresh air. Avoid everything which is known to bring on an attack and insist on a thorough physical examination.

Hay Fever and Asthma

Hay Fever and Asthma. There is no essential difference between these two conditions; in the first the nasal mucosa is involved, in the second the bronchial mucosa or both. The condition is defined by Osler as a reaction of an anaphylactic nature in sensitized persons, in others possibly a reflex neurosis, characterized by swelling of the nasal or respiratory mucosa, increased secretion, and, in asthma, spasm of the bronchial muscles with dyspnea, chiefly expiratory. In infancy there is a very close association of asthma with bronchitis, but in the older child the condition resembles the adult form above described.

The condition is often hereditary. It is particularly frequent in children who had eczema in infancy. Local sources of irritation in the throat and pharynx, such as hypertrophied tonsils, adenoids, chronic hypertrophic rhinitis, sinusitis, etc., are recognized as predisposing causes. Contact with animals, such as a pet cat or dog, horses, domestic fowl, etc., may initiate an attack. The pollens of various plants, such as ragweed, golden rod, timothy, etc., have a similar action. Schloss and Talbot showed that certain foods, particularly milk, eggs, cereals, and many others when contained in the diet will give rise to asthmatic attacks. All of these latter causes, i.e., susceptibility to animals, plants, or foods, evidently due to a sensitization against the particular protein, resemble the phenomenon of anaphylaxis very closely. (See protein sensitization tests, Chapter XVI.) Shannon has recently shown that in cases of eczema in infancy, so frequently a

precursor of later asthmatic tendencies, the offending protein can be carried in the breast milk.

These patients are seldom hospitalized except during an acute attack. Measures employed at this time are various. Among the drugs used are stramonium leaves (used as an inhalant), potassium iodid, and atropin. One of the most efficient in giving immediate relief is the intramuscular injection of epinephrin. Tonics, such as cod liver oil, are frequently prescribed following the attack. The coöperation of the nurse is invaluable in seeking out the offending food when the asthma is of that type and in keeping that protein out of the diet thereafter. In the case of an infant the nursing care is usually identical with that of acute bronchitis.

Foreign Body in Larynx

Aspiration of a foreign body into the larynx is not uncommon. It very often happens because the child attempts to laugh or cry when he has something in his mouth. The foreign body entering the trachea may be expelled immediately, remain impacted, or pass on into the bronchi, depending on the size and shape of the object. The first thing to do is to help the child expel the object by inverting him; he may cough and bring it up without further difficulty. But if attempts are unsuccessful, immediate surgery is usually necessary. If the foreign body cannot be removed by bronchoscopy, a tracheotomy may have to be done. To prepare the child for this wrap him tightly in a blanket to restrain him, with his hands down to his sides and legs straight. Place him on his back on a padded table with a hair pillow under his shoulders and his head hanging down, exposing his throat. One person steadies his head, holding it straight with his body while another person holds his feet during the operation. Every children's department should have a complete sterile tracheotomy outfit for emergency use. The tube is held in the child's trachea by means of a tape around his neck, fastened in back. He needs constant watching; a special nurse is necessary until he becomes accustomed to the tube. A piece of gauze should be put between the child's neck

and the flange of the tube to protect his skin; a piece of moist gauze (several thicknesses) is kept over the opening of the tube constantly and changed frequently. The inner tube is cleaned frequently, at least every 2 hours. To do this it is removed and a pipe cleaner, feather or small brush is run through until it is free from mucus; it should be boiled twice a day. The air the patient breathes should be warm and moist. An extremely serious complication is bronchopneumonia.

Pneumonia

Broncho-pneumonia

Pneumonia. Bronchopneumonia is seen most frequently in children under 2 years old; it may be primary or secondary to some infectious disease or to almost any illness of infancy. The mortality is high. The disease runs no definite course; often it lasts over a period of weeks. The nursing care consists in hygienic treatment. Warm moist air (not cold air) is necessary. Antipyretics in the form of cold baths, sponges, etc., may be indicated to allay nervous irritability and to reduce temperature. Fluids should be forced in all possible ways and the diet is usually light but nourishing. Special attention must be given to the care of the mouth. Inhalations may be helpful. The child should be picked up and held for a few minutes several times a day, for a frequent change of position is essential. Never allow the baby with bronchopneumonia to lie in one position for hours. Isolation must be carried out.

Lobar Pneumonia

Lobar pneumonia occurs at any age, but most frequently after 3 years; it is usually primary. The mortality is not so high as from bronchopneumonia. It runs a definite course with a crisis in typical cases as in the adult. Hygienic treatment is necessary. The patient is sometimes ordered to be put in a warm room with plenty of fresh warm air. Sometimes he is ordered to a cold room with the windows open or, if possible, outdoors. In the latter case he must be well protected with shirt, stockings, nightgown, flannel wrapper, and a cap on his head; he should have a woolen blanket directly over him and have hot water bottles at his feet. The

small child who will not keep his hands covered can be put in a sleeping bag with a hood. He usually has less dyspnea if he can sit up. It is difficult to keep a small child comfortable and in proper position when he is sitting up. The pillows must be arranged so that he is not doubled over on himself, but so that his head and shoulders are bent backward enough to allow him the fullest possible breathing space or his dyspnea will not be helped by the upright position. The nurse must visit him every few minutes to rearrange his pillows and to keep him in the proper position, for he is very restless. Isolation technique is carried out. Cold sponges, etc., are often necessary to allay nervous irritation and to reduce temperature. Fluids must be forced in all possible ways; the diet may be liquid or light. The mouth needs special nursing care to keep it clean; apply cold cream to the lips (see care of mouth, Chapter VI). Even after the child is over the crisis he must be kept quiet to avoid strain on the heart and the development of heart complications.

Dry Pleurisy

Dry Pleurisy. In this condition the pleura is covered with an exudate composed mainly of fibrin. The symptoms are sharp, localized pain increased on respiration and a short, teasing cough. The pain, particularly in childhood, is often referred to the abdomen.

The condition is seldom seen in childhood as an isolated clinical disease. It is almost invariably a complication of bronchopneumonia and occasionally of tuberculosis. It is a frequent cause of the "growing pains" described by the laity.

The treatment, apart from that of the underlying condition, consists of counterirritation achieved by painting the affected area with tincture of iodin or by applying a mustard poultice. Immobilizing the affected side by strapping it with a wide band of adhesive plaster will often relieve the pain.

Pleurisy with Effusion

Pleurisy with Serous Effusion. This condition often succeeds that just described. In addition to the fibrinous exudate

upon the pleura found in the "dry" pleurisy, there is an effusion of serum from the blood vessels into the pleural cavity. This, when at all extensive, can cause serious embarrassment from pressure upon the heart and lungs so that cyanosis may be seen and dyspnea is common. It may go on to an empyema.

This condition in early childhood is generally seen as a complication of pneumonia, although later pulmonary tuberculosis may be the cause. It is also seen in nephritis, in acute rheumatic fever, scarlet fever, or any of the acute infectious diseases.

The treatment, other than symptomatic, is directed to the underlying condition. It may be necessary to do a thoracentesis to relieve cardiac or respiratory embarrassment. Prolonged rest in bed, even in the absence of any acute symptoms, is very important.

Empyema

Empyema is an inflammation of the pleura in which true pus is formed and collects in the pleural cavity. There may or may not be any dyspnea, although respirations are accelerated. Cough is present in most cases. There is marked anorexia with consequent loss of weight, which in the prolonged cases goes on to emaciation.

In 90 per cent of the cases occurring in children under 5 years there is a pneumonia present or initiating the condition. In later childhood tuberculosis may be the underlying cause. More rarely, it is found complicating any of the acute infectious diseases and is found in pyemia from whatever cause.

Empyema is always serious and particularly in the first two years has a very high mortality. On the other hand, it is an extremely satisfying condition to treat when seen early and intelligently handled. The treatment is always surgical and there are many methods in vogue at the present time. However, whatever the method, whether it be simple tube drainage, irrigation with Dakin's solution, or tube drainage combined with some suction apparatus, or rib resection, the

aim is always the same, i.e., the constant and complete evacuation of the pus in the pleural cavity. Asepsis in the changing of dressings, cleansing of tubes, etc., is very important. General hygienic measures with especial care of the diet will influence greatly the ultimate prognosis. Blow bottles to aid in expanding the lung are indicated later in the course.

Lung Abscess

Abscess of the Lung. This rather rare condition may occur as the unusual complication of a pneumonia or as a local inflammatory reaction to a foreign body in the lung. The treatment is similar to that of empyema, i.e., surgical, and the nursing care is identical.

Bronchiectasis

Bronchiectasis or chronic interstital pneumonia is a chronic pneumonia with the inflammation usually confined to the connective tissue framework of the lung and accompanied by dilatation, i.e., bronchiectasis of the smaller bronchi. It may often follow repeated attacks of acute bronchitis; in later childhood it frequently complicates tuberculosis.

There is no specific therapy. A change of climate may help. The general régime advised is the same as for tuberculosis. The nursing care does not differ.

5. Diseases of the Genito-urinary System.

The nurse who is responsible for the care of a child, especially of a sick one, must watch him closely for any disorders of urinary secretion. Congenital malformations have been discussed. Various urinary disturbances, as anuria, retention of urine, suppression of urine, polyuria, frequent micturition, or incontinence of urine, must be reported whenever they are observed, since they are all significant.

Nephritis

Nephritis occurs frequently as a complication of infectious febrile diseases. Here as in so many of the diseases of childhood prophylaxis is the most important point. When a child is suffering from any infectious febrile disease, the kidneys should be spared as much as possible by rest in bed, prevention of exposure or chilling, a diet low in protein and the forcing of fluids to increase the elimination of

toxins. The skin must be kept active by frequent sponging and warm baths. The bowels should be kept open by laxatives. The treatment of nephritis follows the same rules as the prophylactic measures. The child should have the benefit of hygienic surroundings. He must be kept quietly in bed and all chilling or exposure must be avoided. He should wear a shirt at least part wool, stockings, nightgown, and a flannel wrapper, and he should have a woolen blanket directly over him. Warm fresh air is necessary. The diet must be regulated to meet his tolerance for protein, it being remembered, however, that he should, if possible, be allowed enough food for his needs of growth. If he has edema, his fluid intake is usually limited and salt is restricted. Both his daily fluid intake and output, including liquid stools as well as urine, must be carefully measured and recorded. A specimen of urine is saved for daily examination. Elimination through the skin is increased by frequent sponging and warm baths. Hot air baths and hot packs may also be needed. (See method of giving, Chapter XVII.) The desire for salt and water and the long confinement to bed may make the child extremely unhappy and irritable. The nurse must use her influence to keep his mind from his own discomforts and she should keep his hands occupied with such amusements as his condition will permit.

Pyelitis

Pyelitis is a frequent complication of many diseases of childhood; occasionally it is primary. It occurs alone or with cystitis (pyelocystitis). It is more frequent in females than in males. Whenever any child has an unexplained elevation of temperature, a specimen of urine should be obtained to rule out the possibility of pyelitis. The child with pyelitis is usually quite irritable and demands patient, tactful management. Fluids must be forced to the limit (see methods of doing this and amounts to be forced at various ages, Chapter XVII). Drugs may be given, hygienic care, fresh air, sunlight, proper diet, and rest in bed are necessary.

Tuberculosis of Kidney

Tuberculosis of the kidney occurs rarely in childhood ex-

cept as a manifestation of general tuberculosis. The treatment and nursing care must be directed toward general hygienic measures. The child should be treated as any patient with tuberculosis. There may be a complication of pyelitis calling for the forcing of fluids. Some cases are benefited by surgery.

Morbid Growths of Kidney

Morbid growths of the kidney are more frequent in early life than later, especially in the first 5 years. The great majority are malignant in nature. The growth of the tumor, particularly if it is sarcoma, is rapid so that it soon fills a considerable portion of the abdominal cavity. The child suffers from a variety of symptoms which are due to pressure and metastasis. He develops marked emaciation and anemia. The only treatment is surgical. The prognosis is very unfavorable. The nursing care before or after operation is the same as that of any very sick child. It is largely symptomatic. The nurse should do everything in her power to keep the child comfortable. Narcotics or sedatives for the relief of pain seem justifiable.

The child has often been known to introduce *foreign bodies* into the bladder through the urethra. The nurse must watch closely the child who frequently handles his genitals and if he does not stop after being reprimanded or if he is not old enough to understand, his hands will have to be restrained to break him of the habit.

Enuresis

Enuresis is incontinence of urine or bed wetting.[16] If a child over 3 years is troubled with it, he should be examined by a doctor to see that there is no deformity or disease causing it. It may be a habit due to lack of training, and if so, strict discipline must be exerted at once. If the child's confidence can be gained, he will often be very coöperative in his endeavors to overcome the habit, since he will be very much ashamed of it. Although there are a great many methods of treatment prescribed, the following indicates the usual line of approach: the child should be allowed no

[16] Carter, William, M.D., ''Enuresis.'' *Arch. Ped.*, May, 1920.

liquids after 4 P.M. and his evening meal should consist of no highly seasoned foods. He should urinate before retiring at night; he should be taken to the toilet again at 10 P.M., and once or twice after that during the night if necessary, always at regular intervals. Thoroughly awaken him so that he will know what he is about and make him walk to the toilet himself, because if conditions are made too easy for him, he will never overcome this habit. Do not allow him to become overtired for fatigue may be a factor in enuresis. Elevating the foot of the bed at night may help.

Male Genital Organs

Phimosis

Male genital organs. Malformations have been discussed under diseases of the newborn. Whenever the nurse notices *phimosis,* she must report it to the doctor and follow his wishes in regard to retracting the foreskin. There is much difference of opinion on the subject. If circumcision is performed, the child should be kept quietly in bed for a few days and the penis should be covered with a sterile vaselin dressing. This can be held in place with a T binder and should be changed after every urination. Efforts should be made to prevent the penis from becoming infected with feces.

Hydrocele

Hydrocele occurs in small children. The nursing care involves nothing special. If it is aspirated, care must be taken to prevent infection.

Undescended Testicle

Undescended testicle calls for the same sort of postoperative nursing as hernia. However, it is not usually operated on until the child is old enough to have control of the bladder, and so offers no difficulties.

Female Genital Organs

Gonorrheal Vaginitis

Female genital organs. Gonorrheal vaginitis is frequently found in little girls of all ages and epidemics have been common in hospitals and children's institutions. It is extremely infectious and the mucous membrane of the vagina seems peculiarly susceptible. Therefore, the utmost precautions are necessary to isolate the infected cases. Infection is transmitted (1) by the use of a common toilet seat; (2) by improperly laundered napkins; and (3) by the use of common articles, improperly sterilized, between children; (4) by

nurses' hands; and (5) by careless technique of various kinds. To prevent the spread of the infection it should be routine to take vaginal smears from every little girl who is admitted to an institution and she should be isolated until these smears are reported negative. Every sign of a vaginal discharge, or inflammation of the genitals, no matter how long the child has been in the hospital, should be reported at once. The care of gonorrheal vaginitis calls for strict isolation, a separate bed pan, separate toilet articles, and sterilization of all articles used by the child. She should be instructed not to put her hands near the genitals because there is danger that she may infect her eyes. If she is not old enough to understand the importance of this, her hands must be restrained by cuffs or by tying. The nurse must exert care not to infect herself, particularly her eyes, when caring for a case of gonorrheal vaginitis. Whatever the treatment employed the genitals must be kept clean by frequent sponging, and a soft pad of absorbent cotton and gauze should be worn over the genitals and should be destroyed when soiled. (Technique of vaginal treatments discussed, Chapter XIX.) Some of the various treatments which may be used include: (1) medicated vaginal suppositories; (2) antiseptic douches; (3) silver nitrate or some antiseptic injected into the vagina with a medicine dropper; (4) antiseptic in the form of an ointment injected into the vagina; (5) dry dusting powders over the genitals. In carrying out any line of treatment the important part for the nurse to bear in mind is the necessity for extreme care and gentleness, in order not to injure the very delicate mucous membrane.

To Prevent

Isolation

Restrain Child's Hands

Clean Genitals

Various Treatments

6. Diseases of the Nervous System.

(The following section on Diseases of the Nervous System has been approved by Dr. J. C. McKinley, University of Minnesota.)

Convulsions occur more frequently in infancy than in any other period of life, and the frequency of their occurrence

Convulsions

diminishes steadily during early childhood so that they are relatively uncommon after 7 years. A convulsion is a symptom of trouble, not a disease.[17] The child who has a convulsion, even a slight one, must have medical attention. Convulsions in infancy and childhood may be caused by or associated with such conditions as:

Causes

Organic origin
1. Acute infectious diseases.
2. Toxemia from asphyxia, uremia, poisoning, etc.
3. Disease or injury to the brain, meningitis, poliomyelitis, hydrocephalus, tumors, embolism, thrombosis, intracranial hemorrhage of the newborn.

Functional origin
1. Idiopathic (so-called) epilepsy.
2. Emotional disturbances, as fright, anger, violent crying, etc.

Other causes
1. Acute and chronic gastro-intestinal disorders.
2. Hyperpyrexia—heat stroke.
3. Terminal convulsions.
4. Spasmophilia.

Symptoms

Convulsions are usually sudden in onset and are initiated by facial pallor, fixation, and sometimes a rolling or crossing of the eyes and a general stiffness of the body. Twitching then begins in some part of the body, the face or an extremity. The twitching increases in severity and extends so that all parts of the body are involved. Consciousness is lost. The head is held backward, the back is arched, the arms are flexed, the hands are made into fists with thumbs in palms. There are clonic to and fro movements of the extremities, quick and jerking. Similar movements in the face cause a series of grimaces. The spasm includes the muscles of respiration so that breathing is suspended or irregular or ineffectual. Cyanosis appears, especially about the lips. There may be frothing at the mouth and rattling in the larynx. The pulse is weak and often irregular. After

[17] Morse, J. L., M.D., "The Convulsive Disorders of Childhood." *Journ. Amer. Med. Assn.*, Jan. 21, 1922.

several minutes the convulsive movements become weaker and less frequent and finally cease. The body relaxes, consciousness returns, and the child cries, or if the convulsion is severe he remains somewhat stuporous. The convulsion may not be repeated or it may occur frequently over a period of several days. All convulsions are not as severe as the above description indicates. They may be lacking in several of the described features and may be of very short duration.

The type of convulsions previously referred to might be spoken of as the cortical type. An infrequent variety is the spinal type, which is usually predominantly tonic in character and is not associated with loss of consciousness, as is the cortical type. The spinal type is seen in cases of strychnin poisoning and in the infection, tetanus. The treatment is the same for the spinal as for the cortical type.[18]

The convulsions caused by "Jacksonian epilepsy" are quite definite; the first movements are likely to be seen in the region presided over by the portion of the brain affected, therefore it is important to notice where these movements begin. Other portions of the same side of the body may become involved in the attack. Consciousness is often retained and when lost is lost late in the attack.

Since the nurse and not the doctor is usually present to see the first of the attack she should carefully observe all symptoms to relate them to him, as they are all most significant in determining the cause of the convulsion.

Treatment

The first duty to the child having convulsions is to bring the convulsion under control and to see that he does not injure himself; if he has teeth a mouth gag should be put between his jaws. Relaxation may be produced by the application of counterirritants to the surface of the body, heat to the feet, and cold to the head. The child is sometimes put in a hot bath (100° F.), a mustard bath may be given (see directions) or a mustard pack. Since he should be disturbed as little as possible, the mustard pack has an advantage over a

[18] Marriot, Wm. McKim, M.D., Unpublished Notes for Nurses.

hot tub, as the former can be given with less disturbance. It is evident if the convulsion is due to the action of a high temperature, as in heat stroke, that a hot bath will do harm, and that a cold bath is indicated to reduce the temperature. A colon flush may be given. There is nothing more a nurse can do for immediate relief of a convulsion without a doctor's orders. The latter should be called immediately, as a neurological examination made, if possible, during or following a convulsion may be a deciding factor in establishing the diagnosis. Chloroform may be given the child; oxygen is sometimes beneficial. Sedatives may be ordered, as morphin sulphate, bromids, chloral hydrate, etc. Magnesium sulphate subcutaneously is often given. If indicated the stomach may be lavaged or a cathartic may be given. Attempts must be made to determine the cause of the convulsion in order to remove it, if possible, and measures must be taken to guard against the repetition. The nurse's accurate observation of the early symptoms before the doctor arrives will be of inestimable diagnostic value to him.

Spasmophilia *Infantile tetany or spasmophilia* is a disease characterized by extreme irritability of the nervous system to mechanical stimulation. It is usually associated with rickets and seems to be closely connected with changes of calcium metabolism. During the acute attack the patient should be kept quiet, away from noise and excitement. Warm baths may be given to relieve the convulsions. Further nursing care calls for the correction of the diet and hygienic care, including sunlight and fresh air. Calcium chlorid or calcium lactate are usually given.

Epilepsy *Epilepsy* occurs in childhood as in adult life. During the seizure the nurse must see to it that the child does not injure himself; place him in a comfortable position, loosen the clothes about his neck and waist and put a mouth gag (a cork or a rubber) between his teeth to prevent him from biting himself. The child subject to epileptic attacks must have constant supervision because of the danger of an attack, and he must

lead a quiet life free from mental or physical strain. Further regulation of his activities should be in the hands of a physician.

Chorea

Chorea is a nervous disease characterized by aimless, irregular movements of any or all voluntary muscles. It is closely associated with rheumatism, tonsillitis, and heart disease. During the acute attack of chorea the child must be in bed and must be isolated from any possible excitement or noise; visitors must be excluded. If the movements are violent the sides of the crib must be padded or the child will injure himself. Restraints should not be used. Sedatives may be ordered to control the child. General hygiene and proper diet, etc., must be emphasized in the care of the child with a tendency to chorea. Fresh air should be obtained, but exercise must be prescribed with great caution, and its effects must be carefully watched. The child must be removed from any disturbing influences and should be placed under the care of some one who understands him and who can manage him wisely, without causing friction and so that scolding or punishment will not be necessary. School work is allowed only with the doctor's permission and under careful supervision. He must never be pushed in his studies; his outside activities as music, dancing, etc., must be eliminated, and his athletic activities must be restricted. Chorea has a strong tendency to recur. The present rôle of mouth infection as an etiological factor necessitates examination for the removal of possible foci.

Speech Defects

Speech defects in children are significant and should be recognized and attempts should be made to correct them at an early age.[19] Dr. Blanton says that speech disorders are early and valuable symptoms of anomalies of intellectual and emotional growth as well as organic difficulties of the nervous

[19] Blanton, Smiley, M.D., "Medical Significance of the Disorders of Speech." *Journ. Amer. Med. Assn.*, July 30, 1921.

Gifford, Mabel F., "Speech Disorders and Defects." *Arch. Ped.*, May, 1920.

system. They are due to lack of ability on the part of the child to adapt himself emotionally to social situations, or to a faulty sensory or motor speech mechanism either hereditary or acquired.

Injurious Habits of Childhood

Injurious habits of childhood are many and various; they are closely connected with the disturbances of the nervous system. The tendency is too frequently to disregard them and pass them by with the remark that the "child will outgrow" them. This is wrong: the first time it is noticed that a child is developing a habit measures should be taken to arrest it. At that early stage it can be done with little difficulty. In the case of *thumb sucking* the child's hands should be restrained so that he cannot put them in his mouth; aluminum mittens may be put on; cuffs can be put around the elbow; or his hands can be tied to the sides of the crib. Often a child forms a habit of stroking or sucking some soft wooly object when going to sleep, and after a short time will refuse to go to sleep without it; such notions should not be tolerated. *Nail biting* is a habit which must not be allowed. As this occurs in older children restraints are not usually possible; punishments do no good; rewards sometimes help. Win the child's confidence and try to explain to him in terms that he can understand why he should not continue the habit. *Gritting of the teeth* may sometimes be observed in a sleeping child, and often in a very sick child, as with peritonitis, etc.

Masturbation

Masturbation is the habit of irritating the genitals; the child may do this with his hand, by rubbing the thighs together, with some object, or with his clothing. This habit is seen in children of all ages and in both sexes; it has even been observed in infants under 1 year. It is commonly practiced by the mentally defective of any age. The habit may be caused by any local irritation which makes the child rub the genitals; a pleasant sensation results and then a habit is begun. Lack of cleanliness of the genitals, highly acid urine, adhesions, vulvovaginitis, eczema of the labia, or tight clothing are some of the predisposing causes. An older child may

be taught the habit by some associate. The small child usually masturbates by rubbing the thighs together. The older child seems to know instinctively that he is doing a forbidden thing when he masturbates, therefore he will do it in secret and the utmost vigilance is necessary to discover him in the act.

Treatment consists in finding the cause and removing it. A small child can be restrained; if he is using his hands they must be tied. If he is rubbing his thighs together his legs must be tied to the sides of the crib or a padded splint adjusted between the knees to keep the legs apart. An older child cannot be restrained easily. In the first place he will not masturbate when he is being watched, but will do it after he has gone to bed and early in the morning after he wakens. Constant watchfulness is necessary to break him of the habit. Punishment will do little good, in fact it usually makes him worse by teaching him to practice deceit. Many different methods will have to be resorted to to reach the individual child. General hygiene, as proper living conditions, diet, exercise, sleep, and clothing should be looked into. If he is old enough to understand win his confidence and appeal to his sense of honor. Keep him well occupied during the day; watch him in his play, and especially watch him with other children to see that he does not teach them the habit. Keep him under close observation at night. Do not let him realize he is being watched. Do not instruct the older children or the parents that masturbation leads to insanity, etc., as this is frequently the basis of a neurosis far more troublesome to deal with than the habit (Dr. J. C. McKinley, Minneapolis).

There are a great variety of other harmful neurotic habits which are met with in children. They should all be handled in the same general way. Find the cause if possible and remove it; make attempts to early break the habit and look into the general hygienic care.

There are other symptoms which may be manifested by the

so-called "nervous child"; these include hysteria, insomnia, habit spasm, and many others. They usually indicate the maladjustment of the child to his surroundings and the presence of some irritating influence. The cause must always be sought and removed if possible. If the parents aggravate the condition, the child may have to be separated from them for a short time and may have to be placed under the care of some one who understands child psychology well enough to manage him wisely and exercise firm but kind control over him. The nervous child should have the benefit of the best possible hygienic surroundings and modes of living; his diet, his sleep, his exercise, his play, etc., may all have a bearing on his condition.

Disorders of Brain and Meninges

Disorders of the brain and meninges. The child with malformations of the brain and meninges, as anencephaly or porencephaly, etc., lives only a short time and no special nursing care is indicated.

Epidemic Meningitis

Cerebrospinal or epidemic meningitis occurs usually in epidemics. The infection is carried in the discharges of the nose and mouth. Isolation of the child is necessary. He should be in a quiet room away from all noise and should be disturbed as little as possible. The treatment of the disease consists in the administration of Flexner's serum, usually intraspinally. A spinal puncture is done, the spinal fluid is drained off and an equal amount of serum is injected. Further treatment is symptomatic. The nursing care of the child calls for no special pediatric technique, not elsewhere described. It, too, depends largely on the presenting symptoms.

Tuberculous Meningitis

Tuberculous meningitis is the most frequent sporadic form of meningitis seen in small children. Recovery seldom takes place. Isolation is advisable, since the child usually has other tuberculous lesions. The disease may last over a period of weeks with frequent relapses. The patient is usually unconscious for some time before death. Feedings may be gavaged to prolong life. The nursing care is the same as

for any very sick child. Repeated spinal punctures may be done to relieve pressure.

Acute meningitis occurs from other causes, as, for example, pneumococcus meningitis. The nursing care of any type is the same. **Acute Meningitis**

Meningismus or pseudo-meningitis is a term frequently heard by the nurse and it is used to describe symptoms resembling those of meningitis occurring in the course of many different affections of infants and children, especially acute infectious fevers, marantic states, pyelitis, etc. It is a toxic non-infective meningitis. **Meningismus**

A baby with *hydrocephalus* must be carefully handled; whenever he is carried his head must be carefully supported. He cannot turn himself, so the nurse must do this for him and it must be done frequently as the great weight of the head produces pressure spots very quickly. Every effort should be made to prevent them. A thick pad of the finest grade of absorbent cotton has been found helpful to use as a pillow. Pressure of the fluid is sometimes relieved by tapping the ventricles. (See directions for ventricular tap.) **Hydrocephalus**

There are many types of *idiocy* of childhood. The nurse must be well acquainted with the mental as well as the physical development of the normal child to be able to recognize the abnormal. If she suspects that a child is abnormal mentally, she must see to it that he has medical care. A mental test is an aid in determining the degree of abnormality. Some mentally deficient children can be handled very well at home, but the vast majority are better off in institutions, homes, or schools for feebleminded. There, if possible, they are taught clean habits, etc., and are given instruction as their mental condition will permit. In caring for a mental defective the nurse must at all times accommodate herself to the child, always bearing in mind his handicap and always making efforts to help him by teaching, proper training, etc. **Idiocy**

Disorders of the spinal cord:

Spina bifida is a malformation of the vertebral canal with **Spina Bifida**

the protrusion of some part of its contents in the form of a fluid tumor. There are different types of spina bifida. In any type the tumor must be protected from pressure; the child must lie on his face or on one side or the other, well propped so that he cannot turn and thereby injure the tumor. If there is no skin over it, a sterile gauze dressing must be kept over it, which is held in place with a loose binder. Operation is often performed. In a large majority of these cases the tumor is in the lower spine and because of this the wound is very apt to become infected from urine or feces. To avoid this the baby may be put on a frame covered with canvas which has an open space where the baby's buttocks come. Hold him on the frame by passing a binder loosely around his body and legs; turn him on his face and place him so that he will urinate and defecate through the opening of the canvas into a pan under the frame. The baby boy can easily have a tube strapped to the penis to collect the urine and convey it to a bottle hung at the side of the crib (Chapter XV); in this way he can be turned on his side occasionally. This procedure can be carried out on girls but offers more difficulties. There is often paralysis of the lower extremities and of the sphincter muscles as a result of pressure from the spina bifida; therefore, the child is always wet with urine and soiled from feces. Additional precaution must be taken in dressing the wound. Cover the sterile gauze dressing with a piece of oiled muslin or silk a little larger than the gauze, and strap it on with adhesive. Strap the lower edge of the silk tightly to the baby's buttocks and change this as often as necessary to keep the dressing well protected. A collodin dressing over the wound is an added precaution. The baby is turned on his back to be fed and he should be picked up carefully to rest him and change his position. Hydrocephalus is a frequent complication following an operation for spina bifida.

Acute Poliomyelitis

Acute poliomyelitis (infantile paralysis) is essentially a disease of childhood, usually occurring epidemically. No specific remedy is yet known and the treatment is symptomatic,

so there is no definite course to be followed in the nursing care. Absolute rest is essential, even in the mildest cases, and should be continued for an average period of two weeks, or longer if symptoms persist. Pains in the affected limbs during the acute stage may be lessened by the application of splints to insure immobilization, and also at times by wrapping the limbs in cotton. There should be as little handling as possible. It is important to support the limbs so as to lessen the chances of deformity, such as foot drop. After all acute symptoms have subsided treatment will be begun for the development of paralyzed muscles. Massage and passive movements are usually ordered as soon as hyperesthesia has gone, and are continued over a period of years. Active voluntary movements carried out under trained supervision are necessary. Mechanical applications are used to prevent deformity, also to furnish support to the limb to enable the child to walk. (See Chapter XXIV.)

Paralysis

There are many other *diseases of the nervous system* and various types of *paralysis* which occur in children. The care of such cases, as a whole, offers no unusual difficulties from a pediatric point of view. Since in all these cases there is more or less danger of the development of pressure spots, this seems a fitting place to discuss the prevention and care of decubitus.

Pressure Spots Prevention

Wherever there is continual pressure the skin deserves special attention. The first essential is to keep the child dry; this means free from perspiration and urine. Often the case of paralysis is incontinent of urine or feces or both and a Bradford frame is a very valuable aid, for the child may be put on it so that defecations go through the opening in the canvas, and if the patient is a boy a tube may be put over the penis to convey the urine to a bottle beside the bed. He must be turned frequently and must have all points of pressure rubbed with alcohol.

Treatment

The scales of old skin around the affected areas should be cleaned off with benzin and the skin should be rubbed with alcohol several times a day to stimulate circulation. All pressure should be removed if possible by

the use of rubber rings and other measures as the condition indicates. A pneumatic or water bed, if obtainable, is of help. The sheets under the patient must be kept free from all wrinkles, crumbs, etc. If the skin is broken various medications are applied in the effort to heal it. A sterile dressing may be kept over the area, but adhesive must not be used to hold it in place, for the use of it may make more abrasions on the tender skin.

7. Diseases of the Circulatory System.

Congenital Heart Disease

Congenital heart disease is a frequent cause of death in the first few hours of life. The symptoms are usually manifested soon after birth. Cyanosis is one of the most striking and characteristic of them. Atelectasis of the newborn will also cause cyanosis, but the baby with a congenital heart disease will become more cyanotic after crying, while atelectatic cyanosis disappears after crying. The prognosis depends on the type of the anomaly, but over 50 per cent of the cases die before 5 years and a majority between the first and second month. Some, however, reach puberty or even adult life. The patient is usually subject to attacks of cyanosis, dyspnea, etc., due to the congenital anomaly. Treatment is not specific but is symptomatic. The individual has a lowered resistance and is very susceptible to all infections, especially pulmonary, and almost any acute illness may prove fatal. He will have to lead a quiet life with exercise, play, and all activities limited to his endurance. Because he is more or less of an invalid he is apt to become somewhat neurotic unless he is very wisely handled. Do not discuss his disease in front of him by saying he cannot do this or that because he has "heart trouble."

Other Types of Heart Disease

Other usual types of heart disease are caused by infections, as infected tonsils, carious teeth, or following acute infectious diseases, as diphtheria or scarlet fever, etc. It is the nurse's duty, if she knows the child has enlarged tonsils or decayed teeth, to see that he has medical attention. In caring for a

child with any acute infectious disease, the importance of rest and a quiet room with limited activity even after he feels perfectly well cannot be overemphasized because of the large number of cases that develop heart complications. Much serious heart disease can be thus prevented. Tonsillitis and chorea are frequent concomitant diseases. Rheumatism, although seen, is a less frequent complication than in the adult. In the nursing care of a child with heart disease the most important point in every case is as complete rest as possible during the acute stage and for several weeks or months afterwards. The muscle walls of the child's heart are less resistant than those of the adult and dilatation occurs much more rapidly. The consequences are grave indeed. Hygienic surroundings, including fresh air, outdoors when possible, a light nutritious diet that fulfills the child's needs are necessary. If there is respiratory difficulty 5 small meals instead of 3 may be advisable to give him adequate calories for growth. The skin deserves special attention because of the danger of decubitus. An ice-bag to the precordia often gives relief. It may be necessary to prop him up in bed because of dyspnea, but unless he has respiratory difficulty he can be better controlled if he is lying flat. The nurse is obliged to use every means within her power and much patience, ingenuity, and tact in keeping the child properly restrained and quiet. He must be in a quiet, isolated room away from all disturbing influences and excitement. After the acute attack is over he may be given simple games, toys, etc., that do not require too much exertion. Exercise can be started with the doctor's orders and as the child's condition permits. All exercise must be given regularly and systematically and carefully regulated to the child's endurance. The child convalescing from heart disease can be better controlled in regard to activity if with other children with the same condition, not with normal children or with those who are allowed to be more active.[20]

[20] Morse, J. L., M.D., "Children's Heart Hospital at Brookline, Mass." *Mod. Hospital,* June, 1919.

After he has recovered, all his activities, including his school work, his outdoor sports, etc., must be restricted and *all* competitive athletic games will have to be eliminated. Here again the child with heart disease must not be allowed to become neurotic by being constantly reminded of his condition. It is always necessary to use caution in discussing a child's condition before him. Even a very young child who does not seem to understand, or a sick child who seems too ill to understand, will hear and remember much more than it seems possible.

8. Diseases of the Blood.

Anemia

There are various types of *anemia* which occur in childhood. The first step in the treatment is to find the cause and remove it if possible. The nursing care should lay particular stress on hygiene. The patient should be kept quiet, usually in bed. Fresh air and sunshine are necessary and he should live out-of-doors as much as possible. The diet should be simple, nutritious food, rich in iron. The skin must be kept in good condition and the bowels must be regular. The child with anemia is unusually susceptible to infections and must be guarded from damp and cold or undue exposure. Blood transfusions are frequently indicated. Iron in some form is given in most cases.

Leukemia

The nursing care of the child with *leukemia* is, in a general way, the same as that outlined above. The patient is usually very ill and every effort is made to keep him comfortable. The treatment is directed toward the relief of symptoms as they occur. The prognosis is very grave.

Hemophilia

Hemophilia is an inherited, constitutional tendency to repeated, severe, and even uncontrollable hemorrhage produced by the slightest trauma or occurring spontaneously. The patient is known to the laity as a "bleeder." True hemophilia is a disease of the males transmitted through the females. If there is a family tendency to bleeding, this con-

dition should be watched for in the child and if the slightest hemorrhage occurs, the physician must be notified. The same surgical means, especially compression, are employed to arrest the hemorrhage in a child as in an adult. Blood transfusion is usually indicated and repeated transfusions are often given. After the hemorrhage he must be kept quietly in bed until he has fully recovered from loss of blood; and general hygienic measures are observed. The child with hemophilic tendencies must be protected from trauma, for even the slightest bump or bruise may have disastrous results. It is very difficult to thus guard and protect a child and still allow him to develop normally either mentally or physically. Care must be taken that he does not become neurotic.

9. Diseases of the Lymph-Nodes.

Enlargement of the lymphatic glands is common in infancy and childhood. This may be secondary to some infection elsewhere, occurring in the glands into which the lymphatics from the diseased regions drain. Often enlarged glands occur in a child who is in a general poor state of health. *Tuberculosis, Hodgkin's disease,* and the *leukemias* are considered in the differential diagnosis, but the commonest cause is simple *adenitis.* The treatment depends on the cause; surgical drainage **Adenitis** is often necessary in adenitis. It may be unavoidable in tuberculosis. The nursing care calls for general hygienic measures.

10. Diseases of the Ductless Glands.

Cretinism or *hypothyroidism* is brought about by the ab- **Cretinism** sence of the internal secretion of the thyroid gland. The condition is generally first noticed during the second half of the first year, sometimes later, and rarely earlier. Failure to grow and to develop mentally are the first symptoms. The only treatment is the administration of thyroid extract and if begun early enough this gives spectacular results. Here again the nurse may help to determine the prognosis if she is

able to recognize the early symptoms so that treatments may be started early.

Hyper-thyroidism

Hyperthyroidism (Graves' disease, exophthalmic goitre), occurs in childhood, usually in girls between 8 and 5 years. The treatment demands complete mental and physical rest, removing the child from all excitement or contact with other children. Measures are taken to allay the nervousness and to induce relaxation and sleep. Surgery may be advisable in persistent cases.

Other diseases of the ductless glands are present in children, but the nursing care deserves no special attention.

11. Diseases of the Skin.

Miliaria

Miliaria (heat rash, or prickly heat) is a term applied to the rash caused by obstruction of the sweat-glands, occurring with or without inflammation. This condition can usually be prevented by the use of lighter clothing, preferably clothing of all cotton, by frequent bathing, and by the use of plain castile soap and good toilet powder, as boric and starch. The skin must also be kept dry and the temperature of the nursery must not be over 68° F.

Seborrhea

Seborrhea is a functional disease of the sebaceous glands. The term is commonly applied to the dirty yellow crusts seen in the scalps of infants and known by the laity as ''cradle cap.'' Cleanliness of the scalp is necessary to prevent the disease, and to cure it. The crusts are softened with oil at night and washed off with soap and warm water in the morning. This is repeated until the scalp is clean, then apply an ointment as prescribed. A daily shampoo must be given.

Intertrigo

Intertrigo is the term applied to any eruption which develops where two moist surfaces are in contact, as in the folds of the groin, axillæ, behind the ears, etc. The areas should be kept clean, dry, and a powder or ointment should be applied as ordered.

Eczema

Eczema is a most frequent skin disease in early life. To treat it the areas must be freed from crusts; warm oil should

be used to do this, and preferably it should be used to clean the child's entire body. The treatment ordered is then applied to the area. A generous amount of the ointment (or whatever medication is ordered) must be put on, and covered with a dressing. If the lesions are on the body the dressings can be held in place by binders or bandages. If the scalp is affected the hair should be shaved and the dressings should be

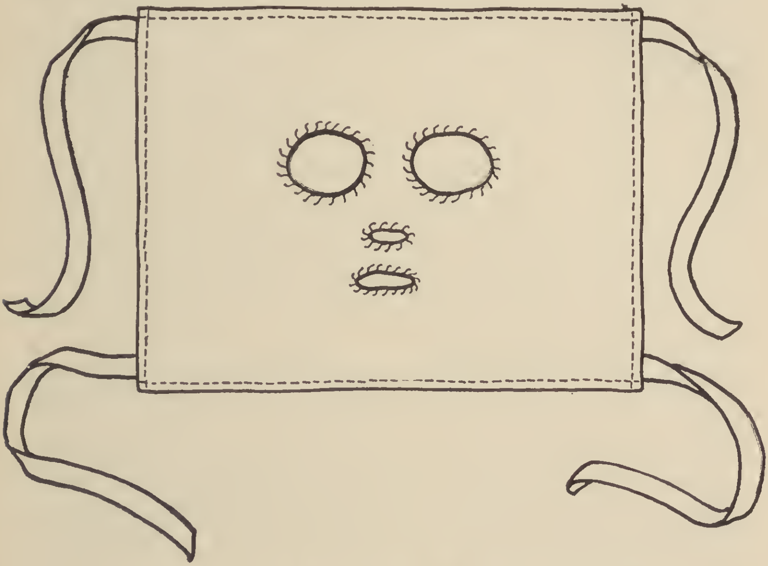

FIGURE 46. FACE MASK USED IN TREATING ECZEMA

kept on by a thin, tightly fitting cap or bonnet which ties under the chin. If the face is involved the ointment is spread on a cotton mask, with slits cut for eyes, nose, and mouth, and this is tied in place. (See Figure 46.) Dressings must be changed as frequently as necessary to keep the affected areas constantly in contact with the ointment or medication. Intense itching accompanies eczema and the child makes his condition much worse if he is allowed to scratch. This must be prevented by restraining his hands. Cuffs may be put around the elbows and his hands usually will have to be tied to the

crib sides. Constant supervision is necessary to see that he does not learn new methods of scratching himself. He should be picked up several times a day to change his position, since the constant restraints and intense itching make him very miserable. A sedative, as chloral hydrate, may be justified to give relief. This is a persistent disease to treat and the restraints are necessary long after the skin lesions seem to be healed because the irritation may persist and scratching will cause a recurrence. Recent work on eczema shows a possible relationship to food sensitization in the infant affected.[21]

Impetigo Contagiosa

Impetigo contagiosa occurs frequently in children and may be a very serious condition. It is extremely infectious and strict isolation must be maintained to prevent the spread of the disease. The treatment and nursing care are the same as for skin conditions in general. *Pemphigus neonatorum* is another extremely serious skin affection of the newborn which resembles impetigo contagiosa in its manifestations. Strict isolation must be observed.

Pemphigus Neonatorum

Other Skin Conditions

Many *other skin conditions* occur in children. The treatment is the same as for adults with the same diseases. Isolation is observed as necessary. Most treatments, as ointments, etc., stain linen, so that special linen, usually the oldest, should be kept separate for the use of children with skin conditions. In most skin affections the child's hands must be restrained to prevent scratching.

Furunculosis

Furunculosis is often seen in children, especially in the athreptic infant, or one who has been in the hospital for a long time and who has become "hospitalized." There are many methods of treatment. Surgery may be necessary. If open-air treatment is desired all the child's clothing is removed, only a diaper is placed under his buttocks, not pinned, and a tent lined with electric light bulbs is placed over his body with only his head exposed. The bulbs are turned on as necessary to keep him warm. He is turned frequently, avoiding pressure on the parts affected. His bed must be kept dry.

[21] Shannon, W. R., M.D., *Am. J. Dis. Child.*, Sept., 1921.

If there is no such apparatus available, as the one mentioned above, the child may be put in a deep basket, as a premature basket, all his clothes are removed, a diaper is placed under his buttocks; a cradle is placed over his body and this is covered with blankets so that only his head is exposed; hot water bottles are put under the cradle to keep him warm. His position must be changed frequently and he should be picked up several times a day to rest him. His hands must be restrained by tying them to the cradle. Whatever the treatment employed for furunculosis, the child's hands must be restrained. Autogenous vaccine therapy is occasionally combined with other therapeutic measures.

Burns or Scalds

Burns or scalds are frequent injuries in childhood.[22] They are due (1) to the child's ignorance and helplessness; (2) the carelessness of attendants; (3) and to the fact that the child's skin is much more delicate than the adult's, and is injured by a lesser degree of heat and in a shorter time. The prognosis is governed by many factors, but is always more grave in the child than in the adult. If over one-third of the body surface is burned death will probably ensue. There are different methods employed in the care of burns, but whatever method is used the wound is thoroughly cleaned first. This may be so painful that an anesthetic will be necessary.

1. Dressings may be applied to the burned areas with the medication, as an ointment or picric acid solution, etc. These dressings are held in place by light binders or bandages. They must be changed frequently enough to keep the burned areas constantly in contact with the medication.

2. The child's whole body may be immersed in a tub of water which must be kept at a constant temperature of 100° F. His body rests in a canvas hammock suspended from the sides of the tub and he is placed so that no pressure is made over the burned areas. A special nurse is necessary to watch him constantly.

3. Paraffin dressings may be used. The paraffin is melted

[22] Kelly, Samuel, M.D., "Surgical Diseases of Children."

in a container. The area to which it is to be applied is thoroughly dried and the paraffin is put on with a brush or a spray. This treatment excludes the air, thus giving relief from pain, and does a great deal toward preventing accidental infection. The paraffin container must be tightly closed when not in use and is heated preferably over a direct flame, for if any water is allowed in the paraffin mixture, its application will be attended with more pain. A thermometer is essential since the paraffin mixture should be used at a certain degree of heat, usually specified by the physician making the application.

4. The child's body may be exposed—open-air treatment. Here the treatment is the same as for the open-air treatment of the child with furunculosis. A tent with electric bulbs inside is placed over his body, or a plain cradle covered with blankets, and hot water bottles are used.

Surgical asepsis must be observed in caring for burns to prevent infection. Oftentimes extreme pain is caused by the changing of the dressing, cleaning the wound, etc. An anesthetic may be indicated. All handling or manipulation must be done as gently as possible to avoid unnecessary pain. Formation of cicatrices must be guarded against. Shock must be watched for in the early care of the child with burns. Fluids must be forced to the limit to prevent absorption of toxins. General hygienic care is necessary.

12. Diseases of the Eye.

(Methods of irrigating eyes, instilling drops, holding of the child for such treatments, etc., have already been discussed, Chapter XIX.)

Gonorrheal Ophthalmia

Gonorrheal ophthalmia has already been discussed under "Diseases of the Newborn," although it may occur at any age. Children are subject to *many other eye diseases*. Whenever the nature of the disease demands it, the child should be isolated. The child of almost any age may rub his eyes, so it is a pretty safe rule to restrain the hands of any child suffering from a disease of the eyes. There are exceptions in in-

dividual cases. It is often necessary for children to wear glasses and it is surprising to observe how quickly a small child will adjust himself to them.

13. Diseases of the Ear.

Inflammation of the ear in some of its forms is of extreme frequency in early life and is associated with many conditions. It may be secondary to almost any illness of infancy or childhood. Routine examination of the ears should be done: (1) On every sick child coming under medical observation for any reason; (2) whenever a child has an unexplained elevation of temperature.

Routine Examination of Ears

Otitis Media

There are many different ways of treating *otitis media,* sometimes irrigations are ordered (see method of irrigating ears, Chapter XIX). Drops may be instilled into the canal (see method, Chapter XIX). From a nurse's point of view the most important point is to keep the external auditory canal free from discharge and dry. This means that in the case of severe otitis media the ear may have to be dry wiped with a toothpick applicator (see method) every 15 or 30 minutes. A special nurse is necessary to give the child proper care. Isolation of the patient is necessary since the disease spreads rapidly among children in the hospital. Hygienic care, sunlight, etc., are beneficial.

Mastoiditis

Mastoiditis is the most frequent complication of otitis media. Proper early treatment will often prevent this. The treatment of mastoiditis is surgical. The nursing care involves no special pediatric technique not already described. There is always more or less difficulty in keeping a dressing or bandage on a child's head, if he is at all active. A muslin cap which fits snugly and ties under the chin may be put on over the dressing and bandage and will help to hold them in place. The child's hands will have to be restrained if he continues to pick at the dressing.

Foreign Body

A foreign body in the auditory canal is a frequent occurrence. A variety of objects are discovered there. They some-

times enter by accident, but more often they are pushed in by the child. The nurse should ascertain the nature of the object if possible. Unless it is a pea, a bean, or some seed which will swell when it comes in contact with water, she may safely try to remove it by irrigating. (See method of irrigating ear, Chapter XIX.) If not successful after two or three attempts, she should summon medical aid.

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CHAPTER XXI

INFECTIOUS DISEASES

Definition

Infectious diseases are those which are caused by micro-organisms (bacteria, protozoa), which are specific for every disease. When an individual is infected by such specific organisms he reacts in a rather uniform manner for every type of organism. The diphtheria bacillus produces only diphtheria, and the virus of measles produces only measles. All infectious diseases are capable of being transmitted from one individual to another. In the case of a few (malaria, typhus, yellow fever, etc.) transmission by contact does not occur. In these the specific virus is not on any exposed part of the body, and, though it is brought to the surface by means of a wound, is not a menace until conveyed into a wound of a susceptible person. Conveyance in these diseases is by means of biting insects. Other diseases (measles, small-pox, varicella) are highly infectious and may be transmitted often by the slightest contact, or by early indirect contact (by means of a third person). In all of the highly infectious diseases the virus has an easy and constant exit from the body of the infected person. In most of these this exit, as well as the portal of entry, is the respiratory tract. Natural transmission takes place most commonly by the inhalation of droplets of secretion which are coughed, are sneezed or otherwise are expelled from the respiratory tract of a diseased person. This mode of transmission is spoken of as droplet infection.

Means of Transmission

Direct contact of the afflicted with the susceptible individual is the most common means of transmission. A source of contagion difficult of control because it is so often unrecognized is the human "carrier," who is a person, having

been exposed to the virus of disease, who continues to harbor this virus in an infectious form without showing clinical evidence of the disease. In most, if not all instances, the carrier either is immune to the virus which he harbors, thus accounting for the absence of clinical evidence, or he suffers from the clinical disease in such a mild manner that its nature is unrecognized. The carrier state has been recognized in cases of diphtheria, typhoid fever, and others. In hospitals where many children are housed together other means of transmission than by direct contact with the disease or carrier, assume a more important rôle than they do in ordinary home life. That certain diseases may be air borne was formerly believed, but this is true only in a limited sense. Some of the diseases in which virus is harbored in the upper respiratory tract are accompanied by coughing and sneezing (measles, pertussis) so that droplets of secretion are expelled a number of feet. A favorable air current carries them further. Such droplets are not carried around corners, or out of one room into another, except under most unusual circumstances. The stirring up of the contaminated dust and fine dirt by improper sweeping or otherwise is another means of air transmission more important in certain diseases than droplets, because of the greater distance to which dust may be carried. Any disease transmissible by contact can, under favorable circumstances, be carried to a susceptible individual by a third person or by contaminated articles (dishes, clothing, toys, etc.). The shorter the time occupied by the journey the more likely is the successful transmission. The virus of certain diseases (measles) is very short-lived and but brief exposure to daylight and drying causes its death. The virus of other diseases (scarlet fever, diphtheria) is tenacious and long-lived, and therefore more likely to be transmitted by indirect contact after a long interval.[1]

To Care for Patients with Contagious Diseases

With proper precautions patients with different contagious diseases may be cared for in neighboring rooms by the same

[1] Marriot, Wm. McKim, M.D., Unpublished Notes for Nurses.

nurses, attendants, etc., without cross-infection. In such cases the application of common sense based upon knowledge should suffice. But a rigid set of rules is the only method that is "fool-proof." The proper technique is, in certain ways, the reverse of that used in the surgical procedures. In the case of a contagious disease the patient and everything with which he comes in contact is contaminated or "dirty," and must be sterilized before being used for another patient. He must be cared for in such a way that the attendant upon leaving the room is "clean" and ready to care for another.

Isolation Rooms

Every children's hospital or department should have separate rooms where it is possible to carry out isolation on those who may develop contagious diseases or who show symptoms suspicious of a contagious disease. Much trouble and many epidemics with resulting quarantine can be avoided if the children's hospital has an observation ward. When a child is admitted he is kept there over a period of two weeks at least, preferably three weeks, until the presence or absence of infectious disease is proved. The ideal observation ward should have separate rooms or cubicles for every child. Since all are considered infectious to others until it has been proven that they are not, complete isolation is carried out. However, few hospitals are thus ideally equipped.[2] If there is no observation ward, every child newly admitted to the general ward must be isolated there as much as conditions will permit.

Observation Ward

The arrangement and facilities of every hospital must determine the details to be followed in isolation technique, but there are a few essential principles which must be observed, whatever conditions may be.

Essentials of Isolation Technique

Gown

A gown must be worn by the nurse for any work which involves intimate contact with the patient. To put on the gown, the nurse removes her cuffs, rolls up her sleeves, and slips it from the hook in such a way as not to contaminate herself; she holds the gown by the neck band and slips one

[2] Doane, J. C., M.D., "Prevention of Cross Infection in the Children's Ward of a General Hospital," *Mod. Hospital,* May, 1920.

arm, then the other into the sleeves and ties the tapes in back. To take off the gown the nurse washes her hands under running water (basin in the room), slips the gown off, creasing it down the center, with the clean side inside, and hangs it on the hook in such a way that the inside is kept clean, and that it can be slipped off the hook again without contamination; she then scrubs her hands again. If no gown is worn the nurse must be careful that none of her clothing touches the bed or anything in the room, and that she contaminates only her hands or forearms, which can be scrubbed. Gowns are changed whenever necessary. If caring for more than one patient with the same infection, the gown need not be changed between patients. Avoid wearing the gown outside the room. In caring for the patient the nurse should collect everything needed, then put on the gown and care for him.

Bed Linen To care for the bed linen, place a clean sheet or clothes bag on a clean newspaper spread on the floor. If a bag is used, before the nurse contaminates her hands, she should turn back a cuff 3 or 4 inches deep. As each piece of linen is taken from the bed it is placed in the bag or on the sheet. When the linen is all collected the nurse washes her hands, closes the bag, and puts a tag on it marked "to boil."

The Room The room should be dusted daily with a damp cloth, according to directions. Place the dust cloth in the bag with the linen to be boiled. Door knobs must be scrubbed with soap and water daily. To sweep the floor sprinkle it with sweeping compound; collect the dust on a paper and place it in the waste pail; a separate broom is used in infected and uninfected areas. The broom is scalded under the hopper faucet after use. A separate mop is used for infected and uninfected areas and it, too, is scalded after use.

Excreta Excreta may be boiled in a specially designed hopper, or it may be disinfected with some such solution as chlorid of lime, 5 per cent. Use twice as much of the solution as there is excreta; break up the feces with a spatula; expose one hour or longer if ordered. Empty pans or urinals are rinsed and

are washed under running water, then are sterilized by boiling for 15 minutes.

Secretions

A paper bag should be attached to the bed or table. Gauze squares (cotton cloth or paper) are used for wiping away secretions and are dropped in the bag after use. A rubber pillow slip is put on under the cotton slip if secretions are profuse. All pads, as those worn by cases of vaginitis, are destroyed at once.

To Serve Meals

To serve meals the nurse puts a bib on the child and takes his tray to the bedside. He feeds himself if possible; if not she puts on a gown and feeds him. Refuse food is scraped from the dishes into a paper bag which is put into the waste pail. Dishes are boiled for 15 minutes. The same technique is carried out when giving the child water, nourishment, medicine, etc.

Thermometers

Every child has his own thermometer which is kept on his bedside table or in the room. The nurse wears a gown when taking the temperature, pulse, and respirations; she removes it and washes her hands before recording them.

Playthings

Playthings must always be tied to the bed.

Charts

Charts or records must be kept outside the room, and must never be put down inside the infected area; they must be handled only by "clean" persons.

All utensils used in the care of the child for carrying out treatments, bathing, etc., must be boiled after use.

The Doctor

The doctor, when examining the child, etc., must observe the same technique as the nurse. Articles used by him in examinations, as the stethoscope, must be washed with soap and water after use.

Visitors

Visitors should be allowed only if the child is critically ill; only parents should ever be permitted. The visitor must wear a gown when he enters the patient's room and the nurse must stay with him during the entire visit, except under special conditions when the visitor is known to be intelligent and can be trusted to follow instructions. The visitor may observe the child from the corridor without wearing a gown.

To Remove Patient from Isolation

When the patient is out of isolation his clothes are removed. He is wrapped in a clean sheet, is taken to the bathroom and is given a soap and water bath and shampoo, is dressed in clean clothes and is taken to a clean bed and room. The bed, table, chair (all furniture), window ledge, door knob, curtain cords, and every article or part of the room touched by the patient are scrubbed with soap and water and the room is aired for a least one day. All linen is cared for as directed above. Mattress and pillows may be sent to the sterilizing room, and should be sent after cases of small-pox and typhus; in other cases they can be aired (in sun if possible) for one day. Rubber goods, as ice-caps, hot water bottles, sheets, etc., are scrubbed with soap and water and aired (in open air) for one day. If possible books, letters, etc., are destroyed; if not they may be pinned in a towel and sent to the sterilizing room. Toys are preferably destroyed; if possible they are scrubbed with soap and water, or aired for a day.

Care of Nurse's Hands

To scrub the hands in caring for isolated cases the nurse turns on the warm water (with knee or foot adjustment on basin), scrubs her hands with liquid soap (in a container worked by the foot) and a stiff brush under the warm running water for two minutes. She rinses them well under running water and wipes them dry, discarding the towel after use.

(The above rules for isolation have been taken from those in use for many years at the University Hospital, University of Minnesota, which in turn were adopted from the "Manual of Aseptic Technique," published by the Providence City Hospital, Providence, Rhode Island.)

The city and state quarantine rules vary and the nurse should acquaint herself with the rules of the locality in which she is working.

CHAPTER XXII

NURSING CARE OF CHILDREN WITH ACUTE INFECTIOUS DISEASES

1. *Scarlet fever* is an acute, contagious disease usually ushered in by vomiting, fever and sore throat and characterized by an erythematous rash, appearing first upon the neck and spreading rapidly over the entire body; it is followed by desquamation. The incubation period is 1 to 7 days. The chief complications are otitis media and adenitis; the more important sequalæ are otitis, causing little or no pain, and nephritis. The constancy of the throat infection in scarlet fever strongly points to the pharynx as the point of entry of the infection. The disease seems to be most infectious during the height of the febrile period, i.e., during the first 3 to 5 days; the infectiousness gradually lessens after that time. It is generally believed to be spread by the secretions of the nose and throat rather than by the desquamating scales. If complicated by otitis media, mastoiditis, etc., the patient is infectious as long as discharges from these lesions continue. The usual quarantine in uncomplicated cases is about five weeks. The mortality is roughly estimated at 10 or 15 per cent, although it is much less in uncomplicated cases. In general the younger the child the greater the danger of death. There is no specific treatment for scarlet fever; the most important points in the treatment are (1) establishing proper quarantine and carrying out adequate means of disinfection; (2) the hygienic care of the child; (3) directing of the diet; (4) watching for complications, especially otitis and nephritis. The child must be kept in bed until his temperature has been normal for at least a week. He should have a warm, well ventilated, sunny room. Nervous symptoms and high temperature can be controlled by hydrotherapy. The sore throat

Definition **Characteristic Symptoms** **Incubation Period** **Complications** **Epidemiology** **Mortality** **Treatment** **Nursing Care**

may be treated by hot saline irrigations (temp. 105°), gargles, sprays, ete.; eervieal adenitis may often be abated by applieation of ice or eold. Itching may occur during the eruptive stage and ean often be relieved by application of sodium bicarbonate, 15 per cent solution, or treatment may be preseribed. The diet is preferably liquid during the febrile stage, then low protein until at least 3 weeks after the onset, beeause of the tendency to nephritis. Plenty of fluids should be given and the urine output, as well as fluid intake, should be measured and recorded. The mouth requires speeial care. Desquamation may be aided by daily rubs with oil, vaselin or petrolatum. Even the mildest complaint of discomfort or pain in the ears must be reported by the nurse, sinee a severe otitis may develop and cause little pain.

Definition **Incubation Period** **Characteristic Symptoms**

2. *Measles* is a highly contagious disease, more widely prevalent than any other eruptive fever; the ineubation period is 11 to 14 days; there is a gradual invasion of 3 or 4 days with symptoms of aeute eoryza; a maeulopapular eruption appears first upon the faee and spreads slowly over the entire body, lasting from 4 to 6 days and followed by a branlike desquamation which is complete in about a week. The most eharaeteristie feature about the exanthem is the appearanee of small, pin point size, bluish white spots surrounded by a red areola on the mucous membrane of the mouth; these are known as Koplik's spots and are very important aids in the early diagnosis of measles before the rash appears

Mortality **Epidemiology**

on the skin. The mortality is low exeept among infants and young ehildren. Bronchopneumonia is the most serious complication. The infeetiousness of measles is greatest during the time of the aeute eatarrhal symptoms. It is infeetious from the very onset of these symptoms and before the appearance of the rash. In most instances the eatarrhal symptoms have entirely eeased within 10 days from the onset, and the infectiousness diminishes gradually with their subsidence. The period of quarantine is arbitrarily set at 2 to 2½ weeks for the very mild eases, and 3 weeks or more

for cases of moderate severity. The presence of discharging ears, or other similar complications, prolongs the period of quarantine. The desquamating scales of skin are probably not of themselves infectious. **Treatment** There is no specific therapy. The child is kept in bed as long as there is fever or other symptoms. Diet is chiefly liquid during the febrile stage, then a light, easily digestible one is given. Because of photophobia the eyes should be protected from light until it is no longer unpleasant. **Nursing Care** The use of a screen or dark glasses is preferable to darkening the room. Nervous symptoms and elevated temperature may be controlled by hydrotherapy. The mouth must be kept clean. Itching during the eruptive stage may be treated as has been suggested for scarlet fever (sod. bicarb. sol. 15 per cent). Complete isolation of the patient is necessary. **Complication** Since pneumonia is a frequent complication the child should be given an abundance of fresh air, without exposing him to cold air; in addition to being fresh the air should be warm and moist.

3. **Definition** *German Measles* or rubella is a contagious, eruptive fever; **Incubation Period** the incubation period varies from 7 to 22 days. It is characterized by a short period of invasion, with **Characteristic Symptoms** mild indefinite symptoms usually lasting but a few hours, and an eruption which is generally well marked but of variable appearance. Swelling of the post-cervical glands is one of the most constant features. The constitutional symptoms are very mild and the disease is not serious. **Complications** There are no complications of importance. **Epidemiology** Rubella is contagious at any time during its course, but it is most highly contagious during the early stages. Quarantine is observed until the rash has faded and symptoms have disappeared. **Treatment** There is no treatment except isolation and treatment of individual symptoms as they arise; **Nursing Care** the child should be in bed and on a light diet as long as the symptoms are present.

4. **Definition** *Varicella* or chicken-pox is one of the most contagious diseases. **Incubation Period** The incubation period is from 14 to 21 days. The disease is characterized by a cutaneous eruption of papules

Characteristic Symptoms and vesicles and by mild constitutional symptoms; serious **Complications** complications are rare. The disease is often confused with variola because of the nature of the rash. The contagium **Epidemiology** of the disease is contained in the vesicles and is communicated by inoculation with their contents. The patient should be isolated and considered contagious as long as crusts are **Treatment** present. Treatment consists of isolation and treatment of symptoms as they present themselves; itching may be allayed **Nursing Care** by sponging with sodium bicarbonate solution, 15 per cent. Oil or vaselin may be applied to the crusts. Scratching must be prevented. The bath may be given with bichlorid of mercury 1 to 10,000 solution in place of water.

Definition 5. *Pertussis* or whooping-cough is a contagious, respiratory disease, which prevails epidemically and in all large cities **Incubation Period** endemically. The incubation period is 7 to 14 days. The disease is characterized by catarrhal and nervous symptoms; **Characteristic Symptoms** the catarrh affects the mucous membrane of the respiratory tract; the most pronounced nervous manifestation is a peculiar spasmodic cough which occurs in paroxysms and which is often accompanied by vomiting. In later childhood it is ranked as one of the milder infectious diseases, but in **Mortality** infancy it is one of the most fatal. The most serious compli- **Complications** cation is bronchial pneumonia. Hemorrhage is occasionally encountered and may be due to the intense congestion incident **Epidemiology** to severe paroxysms. Pertussis may be communicated from the beginning of the catarrhal stage. It is more contagious at this period than later, but it is contagious throughout the spasmodic stage; however, the infectiousness of the disease is slight after the first few weeks. The quarantine is usually 6 weeks to 2 months. Pertussis vaccine may be used in the **Treatment** treatment and is of value as a prophylaxis; otherwise the management is entirely symptomatic. Mild cases require no treatment; the child need not be kept in bed unless complications arise which demand it. He should have plenty of fresh air and sunlight and should be kept outdoors if the weather **Nursing Care** permits; damp or night air should be avoided. If vomiting is

frequent it is often desirable to refeed him immediately after vomiting because in most instances it is not due to gastro-intestinal derangement. Various drugs, etc., may be ordered to control the paroxysms of coughing: a simple method, which sometimes helps to cut short the paroxysm, is to forcibly push the lower jaw forward. (Marriot.)

Definition

Incubation Period

6. *Mumps,* epidemic parotitis, is a contagious disease, the incubation period being 2 or 3 weeks. It is characterized by swelling of the parotid, and sometimes of the other salivary glands, with constitutional symptoms which are usually mild.

Characteristic Symptoms

Pain usually precedes and accompanies the swelling of the jaw, which may be on one or both sides.

Complications

Complications are not common; occasionally orchitis occurs, and in the female a similar inflammation of the ovaries, uterus, breasts, and external genitals.

Epidemiology

Mumps is contagious from the beginning of the symptoms and isolation is usually maintained for one week after the swelling has disappeared, about three weeks in all. The virus is unquestionably present in the saliva of the patient.

Treatment

If constitutional symptoms are present the child should be kept in bed. The glands may be protected by flannel or absorbent cotton and heat may relieve pain.

Nursing Care

Diet is liquid, because of pain produced by mastication. The mouth should be kept clean by the use of antiseptic mouth wash and frequent cleaning.

Definition

Characteristic Symptoms

7. *Diphtheria* is a specific infectious disease, characterized by a local fibrinous exudate usually upon the mucous membrane of the throat and by constitutional symptoms due to toxins produced at the site of the lesion. The presence of the Klebs-Löffler bacillus is the etiological criterion by which true diphtheria is distinguished from other forms of membranous inflammation.[1]

Site of Lesions

Lesions may occur on any part of the surface of the body and are frequently found on other parts of the respiratory tract than the throat; very commonly several of these sites in the respiratory tract are involved at the same time.

Prevalence of Disease

Large cities are never entirely free from

[1] Osler, Sir William, M.D., "Principles and Practice of Medicine."

diphtheria but the incidence increases very noticeably, often to the extent of an epidemic, with the coming of winter; summer brings a very marked decline in the number of cases. Diphtheria occurs at any and all ages, but with by far the greatest frequency between 2 and 6 years. One attack does not protect against subsequent attacks.

Faucial Diphtheria

Faucial diphtheria, a diphtheria of the tonsils and tonsillar region, is the most common variety which is encountered, and may be considered the ordinary type.

Incubation Period

Incubation period is 1 to 4 days.

Characteristic Symptoms

The constitutional symptoms of the acute stage are the same as those of acute tonsillitis which is caused by other organisms. There is fever, soreness of the throat, malaise, and often headache. There is at first a redness of the throat. Very quickly there appears a grayish white deposit, which coalesces, becoming a dirty gray. The breath becomes foul. The membrane may be peeled off with some difficulty, leaving a bleeding surface; it tends to spread from the original site. Very frequently the uvula and soft palate may become involved, and, less frequently, the hard palate. It may also extend to the pharynx, larynx, and nose. There is usually some, and there may be marked involvement of the cervical lymph-glands so that the neck becomes greatly swollen. When the disease becomes advanced there is marked prostration. When untreated with antitoxin it progresses

Mortality

until the death of the patient, or until sufficient immunity is established to overcome it. A certain number will recover without treatment, but the mortality under such circumstances is exceedingly high. The damage caused by diphtheria consists of local destruction of tissue and the effects on the body of toxin which is absorbed from the local process. The local destruction of tissue is relatively unimportant. If the amount of absorbed toxin is great the patient dies early in the disease with little or no localizing manifestation of the effect of the toxin appearing. The absorption of smaller

Complications

amounts of toxin produces lesions (degeneration) which become manifest late in the disease, usually after all local signs

have disappeared. The extent of the degeneration depends upon the amount of the toxin absorbed, which, in turn, depends upon the extent of the local process and the length of time it has been present. Degeneration of the kidney is shown by albumin and casts in the urine, and sometimes by symptoms of nephritis. Degeneration of the heart muscle (myocarditis) is manifested by dilatation of the heart, rapid, irregular pulse, and often by signs of cardiac incompetence, ending in death. Degeneration of the nerves results in loss of function (paralysis) of the parts supplied by the affected nerves. All degenerative processes tend to recover ultimately if the patient lives. Involvement of the vital organs (heart, respiratory muscles, kidney) often does not allow the patient to live long enough to accomplish local regeneration.

Diphtheria Paralysis

Of *the diphtheretic paralysis* that of the soft palate is most frequent and the earliest, usually occurring during the second week of the disease. The symptoms are a nasal voice and difficult swallowing. The attempt to swallow liquids results in regurgitation through the nose. Food is sometimes aspirated into the lungs with resulting pneumonia. Heart symptoms usually make their appearance in the third week, and various paralysis (extremities, etc.) after this time.

Diagnosis

The diagnosis of diphtheria is made in part by the clinical features and by the finding of the bacillus in the material from the site of the local disease.

Use of Serum

The injection of serum from an immunized animal into another animal or into a human patient confers immunity to the injected individual, with the result of curing diphtheria if present or of preventing the individual from acquiring clinical diphtheria as long as the antitoxin remains in the body.

To Give Antitoxin

Antitoxin may be given subcutaneously, intramuscularly or intravenously, depending upon the purpose to be accomplished. Subcutaneously antitoxin is slowly absorbed over a relatively long period (several days). For this reason this route is the one of choice when it is desired to immunize for

the protection of those exposed to but not suffering from diphtheria. When a patient has the disease it is desirable to obtain a high concentration of antitoxin in the blood at the earliest possible moment. This is most rapidly accomplished by intravenous administration, and this route should be used in all cases of severe or long-standing diphtheria. Very frequently a severe reaction, accompanied by a chill, high fever and headache, follows intravenous administration. Consequently this route is not advisable in early or mild cases in which there is ample time to allow for absorption from intramuscular injection. Absorption from a muscle is much more rapid than from subcutaneous tissue. In the treatment of diphtheria often both intravenous and intramuscular routes are used.

Treatment

In treating diphtheria the administration of antitoxin in sufficient amount at the earliest possible moment, with the exception of the operative treatment of laryngeal diphtheria, is more important than all other therapeutic measures combined.

Nursing Care

The child should preferably be kept in bed for at least two weeks after he is afebrile. Where there are cardiac complications, confinement to bed should be maintained until these are no longer present. Cleansing gargles, sprays and swabbings decrease discomfort and aid healing of the local process. The diet should be lightened in proportion to the prostration. For severe diphtheria only liquids should be given. The child with laryngeal diphtheria should breathe warm, moist air.

Steam Room

There should be a steam room in every contagious hospital, for after intubation or tracheotomy the steam room is a necessity.

Tracheotomy

Insertion of a tube into the trachea through an incised opening in the neck allows a patient with laryngeal stenosis to breathe freely—this is called tracheotomy. Special tubes are made for this purpose. (See details of care of patient after tracheotomy under diseases of respiratory tract, Chapter XX.) Tracheotomy is not the method of choice for relief of obstruction, but it is sometimes necessary when in-

tubation of the larynx for any reason is impossible. The air the patient breathes after tracheotomy should be warm and moist. Pneumonia is a frequent complication.

Hollow tubes of special shape to fit the larynx, and of a size suitable for the age of the patient, may be inserted by way of the mouth into a stenosed larynx with complete relief of respiratory difficulty. This operation is preferable to tracheotomy because of its simplicity. It also allows the patient to warm and moisten his own respired air. Pneumonia is much less frequent. **Intubation**

In preparing for either tracheotomy, or intubation, the patient is firmly wrapped and pinned in a blanket in order to minimize the struggle.[2] Intubation may be performed with a patient in a sitting posture in the lap of the assistant; or it may be done with the patient recumbent and the head and gag held by an assistant. The recumbent position is preferable because one less assistant is required and the patient is in the position for tracheotomy should this become necessary. Every children's department should have an intubation set with various sizes of sterile tubes ready for immediate use, also a complete sterile tracheotomy set for emergency use. During intubation a silk thread is attached for convenience to the top of the tube. After the tube is in place this thread is usually removed. If, for any reason, it is left attached, the other end is secured to the cheek by adhesive tapes. The child's hands then must be restrained; any restraint employed must not embarrass respiration. Whenever intubation is attempted there should be at hand all instruments required for emergency tracheotomy. Stenosis may be below the tube or the tube may push ahead of it a plug of detached membrane which completely and immediately blocks all passage of air. It is also advisable to have emergency stimulants at hand and ready to use. After intubation and removal of the string the restraining blanket is **Procedure** **Position of Child** **Care of Child after Intubation**

[2] Jennings, Hazel L., R.N., "Equipment and Procedure for Intubation," *Am. J. Nursing*, Nov., 1921.

removed. With a proper sized tube correctly placed in the larynx the epiglottis should close effectively on swallowing so that no food enters the larynx. In some patients, however, the drinking of liquids causes such choking and coughing that especial care must be taken with the manner of feeding. Various positions may be tried to find the one best suited to comfortable swallowing. Placing the patient on his back with his head lower than his shoulders may help. Lying face down with his head over the edge of the bed and sucking through a tube may prove satisfactory. Sometimes gavage is necessary. The gavage tube may be inserted through the nose. If the tube is coughed up the physician should be notified immediately.

Extubation

When the tube has been properly retained it usually is removed after four days. If it then must be replaced it is left in another four days. In the majority of instances the larynx is sufficiently patent at the end of eight days so that the tube may be dispensed with.

Schick Test

Some individuals are naturally immune to diphtheria toxin; others are not. Those who are immune have antitoxin in their blood. When a small dose of toxin is injected into the skin of an immune person there is produced no local reactive lesion because the injected toxin is quickly neutralized. A similar injection of toxin into the skin of a non-immune person causes a very marked local reaction with swelling, redness and later pigmentation. This is known as the Schick test and is an excellent clinical means of distinguishing those who are susceptible to diphtheria from those who are not.[3] Any person with a negative Schick test has sufficient antitoxin in the blood to protect him against diphtheria. Such a person can come into repeated contact with diphtheria patients without fear of acquiring the disease.

Passive Immunization

Passive immunization (injection of antitoxin) is an emergency measure of inestimable value, but the protection it affords is of short duration, sometimes as short as two or

[3] Kilduffe, R. A., M.D., "The Schick Test and Its Practical Application in the Control of Diphtheria." *Am. J. Nursing*, Jan., 1922.

three weeks. Active immunity may be produced by injections of a mixture of toxin and antitoxin. No serious effects attend the injection and often no local discomfort. After a short series of such injections an active immunity slowly develops, which lasts for a number of years. It is advisable for those coming in frequent contact with diphtheria, if found to be non-immune by the Schick test, to become actively immunized by this method. The recent work of Dr. Zingher on this subject is recommended to every pediatric nurse.[4]

Diphtheria Carrier

Any one who harbors the diphtheria bacillus, without at the same time having clinical evidence of its presence, is a carrier. Carriers are themselves immune, otherwise they would have the disease. They are as much a menace to others as those having clinical diphtheria and should be kept in quarantine until the upper respiratory tract is free from virulent bacilli.

Every pediatric nurse should be thoroughly familiar with the principles of immunity, at least to the extent of understanding clearly the rationale of diphtheria therapy. An additional point which bears emphasis here is the opportunity of the welfare and school nurse, in their examination of sore throats, of making possible early diagnosis of this condition.

Definition

8. *Variola* or small-pox[5] is a highly contagious disease which occurs endemically and epidemically in those localities in which vaccination is not in vogue. The incubation period is usually 12 to 14 days. The first symptoms are malaise, dullness, headache, backache, loss of appetite. The onset is sudden and is ushered in by vomiting, high temperature—often 104°—rapid pulse and respirations and prostration. There may be convulsions, delirium and chills. The rash appears in 3 or 4 days and goes through definite stages of (1) macule, (2) papule, (3) vesicle, (4) pustule, (5)

Incubati Period

Characteristic Symptoms

[4] Zingher, Abraham, M.D., "Diphtheria Prevention Work in the Public Schools of New York City." *Arch. Ped.*, June, 1921.

[5] Emerson, Charles P., M.D., "Essentials of Medicine."

crusts, (6) scar, and is followed by desquamation. After the rash appears the temperature falls and symptoms improve. When the pustular stage of the rash occurs the temperature is again elevated, also pulse and respirations are more rapid for a few days. There is a characteristic, unmistakable odor to the skin rash. **Complications** The most frequent complications are affections of the respiratory apparatus, as laryngitis, edema of the glottis, bronchitis, bronchopneumonia, otitis media, multiple cutaneous abscesses, bed sores, and adenitis. **Mortality** The mortality of unmodified small-pox is 25 to 40 per cent or more. **Epidemiology** The disease is transmitted by direct contact. Infection certainly resides in the pustules and crusts. It is also readily communicated in some way before the eruption appears. It ceases to be infectious by the time the crusts have fallen and the skin has become smooth. Isolation must continue until every vestige of the disease has disappeared. This varies from 4 to 6 weeks from its onset.

Owing to the intense infectiousness of small-pox any suspected case should be isolated absolutely and immediately. The extreme diffusibility of the poison renders the quarantine in private homes very difficult, and treatment in special hospitals is highly recommended. Every one exposed to the disease should be promptly vaccinated, since by its more rapid development vaccination may modify or even prevent the action of the small-pox infection.

Treatment The treatment of the disease is purely symptomatic. The patient is kept in bed in a well ventilated room. The diet is liquid during the febrile stage, light nourishing diet after that. **Nursing Care** Water is forced. Hydrotherapy may be indicated to allay nervous symptoms and relieve high temperature. Cold wet applications which are changed frequently may alleviate the itching of the skin. Bichlorid of mercury, 1 to 10,000 solution, may be used for the bath. Crusts may be moistened with oil, vaselin or petrolatum. Scratching must be prevented. The patient's mouth and eyes demand special care to keep them clean.

Vaccination, or the human inoculation of cow-pox virus, is carried out to prevent small-pox. Every one should be vaccinated against it. Vaccination is compulsory in many states before a child is allowed to attend public schools. It is safer if this is done several times during the lifetime. It should be done first during the early months of infancy, as soon as it is certain that the infant is thriving. The constitutional disturbance is much less at this time than later. It should be repeated at 12 or 14 years of age and again at 25 or 30 years. One vaccination may protect for a lifetime, but it cannot be depended upon to do so. (Technique for vaccinating described in Chapter XVI on minor surgical procedures.) The treatment of the complications is not different because of the small-pox present and their nursing care is therefore the same, except for the addition of the isolation technique employed. **Vaccination**

9. *Typhoid fever* is an acute infectious disease due to a specific organism, Eberth's bacillus. Typhoid fever in childhood is not infrequent, but it is rare in infancy. It is almost invariably contracted by drinking water or milk which contains the organisms. The infrequency of typhoid fever in infants who are artificially fed is explained, in part at least, by the fact that most of the water and a large part of the cow's milk taken have been previously boiled or heated in some manner. The incubation period is indefinite, usually 1 to 2 weeks. In general the lesions resemble those of the disease as it occurs in adults. In a considerable number of cases the pathological process in the intestines does not go on to ulceration; when ulcers do form they are seldom large or deep and perforation is very rare in childhood. Cases of typhoid seen in children under ten years old may be described as fever characterized more often by nervous symptoms than by intestinal symptoms. The onset is usually sudden; fever, prostration, vomiting, diarrhea and headache may usher it in. Symptoms are often more suggestive of acute indigestion. There is enlargement of the spleen as **Definition** **Incubation Period** **Characteristic Symptoms**

in adults; but the eruption is less constant, less abundant and less characteristic in childhood, and appears earlier. The temperature usually rises more rapidly than in adults. The remittent character is less marked and the average duration is shorter.

Complications Complications of typhoid in early life are infrequent and mild, however, bronchitis, pneumonia and otitis media do **Mortality** occur. The mortality in children over 3 years old probably does not exceed 3 or 4 per cent, death usually occurring not from the disease but from some accident or complica- **Epidemiology** tion. Since the typhoid-producing bacilli may be found in the patient's blood, stools, and urine, or in rose spots, all secretions must be carefully disinfected and complete isolation of the patient must be maintained until repeated tests **Treatment** prove the absence of the bacilli. The child with typhoid fever must stay in bed during the febrile period and a few days beyond it. He should have a warm, sunny, well ventilated room. The diet usually consists of liquids which are given frequently. Plenty of water must be given. Solid **Nursing Care** food is usually allowed after the temperature has been normal several days. There may be diarrhea or there may be constipation. Tympanitis may be relieved by stupes or by the use of a rectal tube. Hydrotherapy may be employed to allay nervous symptoms and reduce an elevation of temperature. Intestinal hemorrhage and perforation must be watched for even if they do rarely occur. As in adults the mouth demands special nursing care.

Immunization Immunizing treatment for typhoid consists in giving injections of cultures in which the germs have been killed by heat. The results are encouraging. (Griffith.)

Definition 10. *Tuberculosis.* Infection with the tubercle bacillus is exceedingly common in childhood. By the age of 6 years **Prevalence** practically 25 per cent of all children have been infected at one time or another. By the age of 14 years from 40 to 50 per cent, and in some localities apparently 90 per cent have been infected. It is probable that every adult living

in a large community would show evidence of a former focus if sufficiently examined. Very fortunately relatively few children who have been infected show clinical evidence of the disease. Frequently at necropsy foci of infection are found, cured, latent or active, which are in such a location or of such limited extent as not to be demonstrable during life. The frequency of infection may be shown by the cutaneous tuberculin or von Pirquet test (Chapter XVI). **Von Pirquet Test** Such a test when positive means that the individual either has or has had a tuberculous infection. Obviously such a reaction is of greater significance in early childhood than in later life. A positive reaction in a young infant would mean the presence of an active infection at the time of the test. It is necessary to make a distinction between those who have clinical tuberculosis and those who have been infected but do not develop clinical disease. It may be that the difference between merely infection and the active clinical disease is chiefly the massiveness of the dose of tubercle bacilli. The younger the child the more likely is the disease to follow infection. Also the younger the child the more likely is the disease to progress rapidly to death. In later childhood there is a greater tendency to resist the disease. When freely exposed to the infection the infant acquires the disease rather readily. Among adults, on the contrary, tuberculosis manifests so little the characters of a contagious disease that its infectious character was at one time a matter of dispute. Tuberculosis of adults is very likely to be the result of exacerbation of a former infection instead of an entirely new infection.

Source of Infection The chief source of infection is constant association with a tuberculous individual, such as occurs in home life when a member of the family has the disease in an active form. Milk from tuberculous cattle is an infrequent source. Infection may occur by means of coughed droplets directly or by means of dust which has been contaminated by means of droplets or dried sputum. If protected from sunlight

tubercle bacilli withstand drying and the hottest summer heat for long periods. Tubercle bacilli gain entrance to the body either by way of the respiratory or the alimentary tract. They may gain a foothold in the throat, lungs, or bowel. There may or may not be a lesion at the point of lodgement (lesions of the lung are described below). The bacilli are taken up by the lymphatics and are carried to the nearest lymph-glands (cervical, bronchial or mesenteric). In the glands an inflammation is set up of a character similar to tuberculous lesions wherever they may occur elsewhere. If allowed to run its course the inflammatory process goes slowly through the stages of cellular infiltration and caseation (softening). In the cervical glands the clinical course is more easily observed. Here there is swelling, increasing over a relatively long period, some tenderness, finally softening, eventually involving the skin of the neck through which the caseous contents of the focus are discharged. Such a tuberculous sinus tends to continue to discharge over a period of months or even years. If the resistance of the patient is sufficient the described process may be arrested in any stage and may remain latent or may become clinically cured. A latent focus in the glands or elsewhere may have its activity renewed by some other illness, or any other factor which greatly lowers the resisting power of the individual. Measles, pertussis and influenza are especially prominent in this respect. Crowded tenements with insufficient light and fresh air, and scanty and improper nourishment are predisposing causes.

Other body structures may be involved by continuity from the above-mentioned lesions, or bacilli may be distributed from these lesions by way of the lymph-channels and the blood stream. Swallowed sputum containing material from a lung focus may also be a further source of infection by causing intestinal lesions.

Although any type of lesion may be found at any age, certain types are more frequent at certain ages. In the

first 2 years the most frequent sites of infection are the lungs and bronchial glands. Meningitis is very frequent and miliary tuberculosis is common. From the *third to the sixth year* involvement of the lungs and bronchial glands remains the most common form. General tuberculosis and meningitis remain common. Involvement of the cervical and mesenteric glands, and of the intestine, peritoneum, bones and joints increases in frequency. In *later childhood* pulmonary tuberculosis is common but begins to assume the adult type (see below). General tuberculosis and meningitis are less frequently observed. Involvement of the bones, joints, peritoneum and cervical glands remains common. **Sites of Lesions**

In the above tabulation there is to be observed a certain degree of increasing resistance to the tuberculous infection as the age increases. In infancy there is a great tendency for the disease to become widespread, as evidenced in part by the frequency of disseminated tuberculosis and of meningitis. In adults lung infection is the most frequent manifestation of tuberculosis, and lesions elsewhere are relatively uncommon. In children, on the other hand, pulmonary disease, though common, is only one of the many forms to be found with almost equal frequency. These differences constitute further evidence of the tendency to dissemination in early life. In childhood the individual focus shows less tendency to heal than later. Later the formation of fibrous tissue about a tuberculous focus is a great aid in limiting its extent, or in bringing about its clinical cure. Such fibrosis is almost unknown before 2 years and is rare before the age of 7, while in adult life it is the rule. In infancy pulmonary tuberculosis occurs as a bronchopneumonia, which differs but little from pneumonia which is due to other organisms. It affects impartially all parts of the lungs. This type of pulmonary tuberculosis is uncommon in adults and when it does occur has been spoken of as galloping consumption. Death after a few weeks or months is the usual but not invariable result. Pulmonary tuberculosis of adults

is a chronic disease, often running a course of 3 to 5, or even 10 to 20 years. It affects chiefly the apices of the lungs. In infancy and early childhood any focus of tuberculosis affects markedly the lymph-glands which drain the affected region. In adults such an event is unusual, the infection tending to remain limited to its original site, or if the glands are affected it is to a mild and unimportant degree. It seems highly probable that the increased resistance of the older child and adult to tuberculosis does not depend upon the age of the individual but rather upon the protection and partial immunity afforded by previous infection with tuberculosis. The adults of primitive races which have not previously been exposed to tuberculosis react to the infection just as do infants and young children. The disease of the lung involves all parts of the lungs, pursues a rapid course, involves the regional lymph-glands and is often disseminated throughout the body as a miliary tuberculosis.

Tuberculous Broncho-pneumonia

Tuberculous bronchopneumonia has already been partially described. The onset may be more gradual and often the course is more chronic than ordinary bronchopneumonia. There is a cough, irregular or continued fever and wasting.

Bronchial Gland Tuberculosis

Bronchial gland tuberculosis is a very common form in middle and late childhood. It arises in connection with the tracheobronchial glands at the hilus or root of the lung. The onset is insidious and the symptoms are usually vague. The patient is likely to be anemic and below par generally. Such a lesion may break down to cause pulmonary or general tuberculosis. It runs the same chronic course as in the lymph-glands. In a sense these cases represent a middle ground between active clinical tuberculosis and those who are merely infected without showing any clinical evidence of the disease.

Chronic Ulcerative Tuberculosis

Chronic ulcerative tuberculosis of the lungs (phthisis) is the type more common than any other in adult life. This form is rare in infancy and early childhood and is infrequent in late childhood. When it does occur cough and dyspnea

are less prominent than in adults and hemoptysis and involvement of the larynx are rare.

Miliary tuberculosis is the result of dissemination of tubercle bacilli throughout the body, or a large portion of the body by way of the blood stream. There arise multiple foci of infection which by the time death occurs have attained the size of a millet seed (hence the name). Bacilli may be distributed exclusively to the lungs by way of the pulmonary artery, to the entire body except the lungs by way of the general circulation, or both circulatory systems may be involved in the distribution. Slightly different symptoms arise, depending upon the distribution. In general the initial symptoms are vague and are those of general impairment of health (loss of appetite, strength and weight). A moderate irregular and a typical fever develops. All the above signs continue and increase. There is apathy, dullness, and finally coma and death about three weeks from the onset. The diagnosis is frequently quite difficult because of the lack of characteristic and definitely localizing symptoms. If the lungs are involved there is a cough and the diagnosis may be made by an x-ray examination. When there is general involvement of the body the spleen is usually enlarged and the illness in many respects resembles typhoid fever. Ophthalmoscopic examination may reveal tubercles in the choroid of the eyes. In case the meninges become involved in the general distribution the symptoms of meningitis are marked enough to greatly or entirely obscure the symptoms of the disease elsewhere. **Miliary Tuberculosis**

Tuberculosis may involve the bones or joints and it then demands orthopedic care. Infection of the kidney or genito-urinary organs is quite rare in children. Skin manifestations, as *tuberculides,* are not uncommon. *Phlyctenular conjunctivitis* is another rather common complication.

Prognosis The prognosis of tuberculosis in childhood has already been considered in a general way. **Mortality** The mortality is high in infancy and decreases with the increasing age of the child.

Tuberculosis of lymph-glands, bones and joints has a relatively low mortality. Tuberculous peritonitis frequently terminates favorably.

Treatment

Nursing Care

The treatment of tuberculosis is largely hygienic. If the predisposing causes previously mentioned can be reversed or prevented much will be accomplished toward the recovery of the patient. What is needed is abundance of rest, clean fresh air, wholesome food, sunlight and pleasant surroundings. A change to a higher and drier climate may be of benefit. The removal from contact with a continued source of infection is essential. If possible an infant should be removed completely from a tuberculous mother whether or not he has been infected. If this is not possible the mother should be instructed how to protect her infant most carefully. The use of cod liver oil, in combination with creosote, iron or arsenic, is often of great benefit as a tonic.

Definition

Sources of Infection

11. *Syphilis.* Syphilis is an infectious disease of a chronic course with acute or subacute manifestations. It is caused by a spirillum which is known as the spirocheta pallida. It is subject to the same rules for transmission as is diphtheria or other contagious diseases. The organism is unable to withstand drying, and is easily killed by mild antiseptics. Dry surfaces (door knobs, toilet seats, etc.) do not long harbor the virus. Mere washing of contaminated linen renders it safe. The disease is transmitted only by intimate contact between moist surfaces and of course only when the virus is present on one of those surfaces. The normal dry, healthy, intact skin is not attacked. Microscopic breaks in continuity of the skin of which one may be unaware may become infected. For this reason the nurse caring for a child with congenital syphilis should wear rubber gloves. The disease is often spoken of as a venereal disease but in a large proportion of instances the infection is innocently acquired and the primary lesion is elsewhere than on the genitalia.

Syphilis may have its onset at any age from early intra-uterine life onward. No individual is immune. When

the onset is before birth it has been customary to speak of the disease as *hereditary* or congenital, and when after birth it is spoken of as *acquired*. Acquired syphilis in childhood is quite uncommon, while the inherited disease affects about 6 per cent of the infant population of the "dispensary" class. It is the present belief that in all instances of hereditary syphilis the virus has been transmitted from a syphilitic mother to the fetus by way of the placenta. Doubt has been cast upon this belief because the mother is so often, in fact usually, quite unaware of her disease and shows no clinical evidence of it, while the father ordinarily entertains no doubt as to at least the former presence of his infection. It has been the opinion of many, and is still that of a few, that syphilis may be transmitted to the offspring by a syphilitic father without the mother acquiring the disease. However, with a few easily explained exceptions, all mothers of syphilitic children give a positive Wassermann reaction with their serum. Syphilis is a chivalrous disease in that in women it rather uniformly causes less disturbance than in men.

Prevalence

Miscarriages, premature labors, and stillbirths occur in syphilitic families with notable frequency. The excess of these occurrences over those in non-syphilitic families is to be ascribed to the harmful effects of the spirochete upon the fetus. The earlier the fetus becomes infected the less likely it is to be carried to term or to be born alive. The more active the infection in the mother the earlier is the fetus infected. Since syphilis has a great tendency in many individuals to become clinically inactive with the lapse of time, there is very likely to occur a certain succession of effects upon a series of offspring of a syphilitic mother. The early pregnancies result in early miscarriages, later ones result in stillbirths, and still later pregnancies result in living births, the children being first marked syphilitic and dying early, and later being but mildly infected and living. After a still further lapse of time the infection in the mother may have

become quiescent to such an extent that no transmission of the disease takes place and the child is born in a healthy and non-syphilitic state. Anti-syphilitic treatment of a syphilitic mother through her pregnancy, and often only during the latter half of her pregnancy, will result in the birth of a non-syphilitic infant. The treatment of the mother during one pregnancy does not protect subsequent pregnancies unless the treatment has been carried to the point of cure.

Primary Stage

When syphilis is acquired after birth the onset is characterized by a lesion of the mucous membrane or skin known as the "primary sore" or "chancre." The initial sore is the portal of entry of the spirochete into the body. The spirochetes quickly become disseminated throughout the body. The external lesions which are produced by the disseminated spirochetes become manifest in the course of about 3 months, and are known as "secondary" lesions. These eventually subside, the disease becomes quiescent ("latent stage"), and after a period of months or years lesions of a different type from those formerly existing make their appearance. These are known as "tertiary" lesions. The inherited disease goes through precisely the same stages with the exception of the primary sore which is lacking because the infection occurred by way of the placenta. Because the initial sore is lacking, the secondary and tertiary stages are frequently referred to as the "early" (or infantile) and "late" stages respectively. The hereditary disease in early childhood and the acquired disease in adult life differ somewhat in their symptomatology and effects, but not because of any biological difference in the behavior of the spirochete. The clinical manifestations differ in the early stages because in infancy the rapidly developing structures are more profoundly affected than are the same structures when fully developed. They also differ for the reason that certain parts, merely because of rapid growth, are highly vascular, and such vascular areas are more likely to be affected or are affected more severely. Later in childhood, when the develop-

ment is slower or more nearly completed, the manifestations of syphilis approach much more closely the types found in adults with acquired syphilis. The differences that are observed are chiefly: the high mortality of infantile syphilis as compared to the adult mortality of practically zero in the secondary stage, certain changes in bodily development, notably in the teeth, which cannot occur in adults because they are already fully developed, the tendency to secondary skin lesions of greater severity in infancy, the almost constant involvement of the growing portion of the long bones (epiphysis) in infancy, the frequent occurrence of inflammation of the cornea of the eye (keratitis) as a late or tertiary manifestation in childhood. The frequency of syphilitic cardiovascular changes in adults is compared to their almost complete absence clinically in childhood.

Secondary Stage

The secondary phase of hereditary syphilis usually exhibits itself some time between the third and eighth week of life. Rather uncommonly lesions may be apparent at birth or may first appear in the third month. The more severe the infection the earlier the appearance. Since a syphilitic baby may show any combination of a fairly large number of individual types of lesions, it is scarcely possible to describe a "typical case." The most frequent lesion and usually the earliest is a rhinitis (snuffles), which frequently causes complete occlusion of the nose and is accompanied by a serous or serosanguineous (bloody) discharge. The untreated condition becomes chronic and in occasional instances secondary necrosis of the nasal bones causes the falling in of the bridge of the nose (saddle nose). The occurrence of skin lesions is second in frequency. A common type is a maculopapular, copper-colored eruption involving any or all parts of the body. In severe infections there is often an inflammation of the skin about the mouth extending deeply into the skin, which is marked by slightly bleeding fissures which radiate in all directions from the mouth. Unless treated early, these fissures leave permanent scars (rhagades)

which are pathognomonic of early syphilis. Similar involvement of the palms and soles without fissures but with desquamation is common. Third in frequency is enlargement of the spleen. This, however, is but a minor aid in diagnosis, because of its frequent occurrence from other causes. Slight fever may be present in severe cases.

A severely infected infant is very likely to show marked wasting and loss of strength. He is fretful and cries if handled. The cry is hoarse, high pitched, and is persistent, especially at night. The nutrition becomes a matter of grave concern, and death from progressive malnutrition is a frequent result. In the general dissemination of spirochetes over the body there is involvement, or opportunity for involvement, of every organ or structure. It is the involvement of the viscera, which, though exhibiting little or no localizing evidence, is the case of the serious malnutrition and death. In contrast to the serious picture above is the infant who is so mildly infected that at the time of examination he may show no signs whatever of his infection and may seem in perfect health.

Though involvement of the epiphysis of the long bones is almost constant, the lesion is but seldom severe or extensive enough to cause clinical symptoms. The symptoms when they occur are pain and swelling, because of which the part is not used (pseudoparalysis). Lesions of lesser importance, because of lesser frequency, are iritis, choroiditis, optic neuritis, meningitis (hydrocephalus, convulsions) and, as later secondary lesions, condylomata and mucous patches.

Tertiary Stage

The period of secondary manifestations is followed by a period of latency of the infection during which there may be no external evidence of the disease. After the age of 6 or 7 years (occasionally before) the disease again becomes evident with increasing frequency. The lesions assume a somewhat different type from those of the secondary period. These tertiary lesions may involve any part of the body. The parts which are most commonly affected and in the order

of their frequency are the eyes, the nervous system, the bones, joints, and the mucous membranes.

The most common lesion of the eyes is an inflammation of the cornea (keratitis). Fully one-third of all older syphilitic children have this disorder in one or both eyes at some time or other. An increasing cloudiness of the cornea occurs which is associated with impaired vision, photophobia and injection (prominence and fullness) of the conjunctival blood vessels about the cornea. Syphilitic keratitis tends to become chronic and even with treatment the patient is fortunate to have the cornea again clear at the end of a year. Inflammation of the retina and choroid of the eye (retinochoroiditis), causing impairment of vision, is not uncommon.

About one-third of all syphilitic children have a syphilitic infection of the nervous system. The infection occurs during the disseminative or secondary period, but in most instances remains latent until middle childhood or later. Such infection is diagnosed by examination of the cerebrospinal fluid. Various clinical manifestations are observed of all degrees of severity. Of these the following are most common: changes in pupillary reflexes, atrophy of the optic nerve, hemiplegia or paraplegia, dementing processes or milder grades of mental retardation. In late childhood or early adult life tabes dorsalis and general paresis are encountered. Epilepsy is not uncommonly the result of syphilitic changes in the brain.

Of the bones the tibia is most frequently affected. The most common lesion is an inflammation of the periosteum and outer layers of bone causing a swelling, chronic in character and more painful at night. Not infrequently the deeper layers of bone are involved, resulting in a clinical course almost identical with a low grade, chronic osteomyelitis from other causes.

Of the joints the knees are most frequently affected. There may be acute trouble with swelling and pain, or a chronic

synovitis may result with greatly increased fluid in the synovial cavities and with little or no pain or disability.

Gummatous ulcers may appear upon the skin or the mucous membrane. The breaking down of these lesions is the cause of the perforations of the palate and nasal septum which are occasionally observed.

Treatment

Treatment.[6] The treatment differs in no essential manner from the treatment of syphilis of adults. The same drugs, arsphenamin, mercury and iodin, are used but in a dose proportionate to the age or weight of the child. Especial dependence is placed upon arsphenamin and mercury, which are given in courses over a period varying from one to three or more years and until negative Wassermann reactions are repeatedly and persistently obtained. The earlier in the disease treatment is started, the shorter is the period of necessary treatment and the easier is the cure. In young infants intensive treatment may be found to interfere with the nutrition, and as a consequence the method and dosage must be modified accordingly. In certain instances in which the central nervous system is affected, intraspinal administration of minute amounts of arsphenamin is found to hasten the recovery.

(With the kind permission of Dr. Wm. McKim Marriot of St. Louis, the above work on syphilis, that on tuberculosis, and part of that on diphtheria have been taken from notes compiled by him for the use of nurses.)

[6] Jeans, P. C., M.D., "Treatment of Hereditary Syphilis," *Journ. Amer. Med. Assn.*, Jan. 15, 1921.

CHAPTER XXIII

SURGICAL NURSING CARE OF CHILDREN

Preoperative and Postoperative Care of the Infant.

Every surgical case is a case by itself and every infant must be individualized, but there are certain fundamentals concerning the preoperative and postoperative care that have to be considered as a whole. The infant varies from the adult quantitatively and qualitatively; that is, he is not only a smaller organism than the adult but he also presents certain peculiarities.

Preoperative and Post-operative Care of Infant

1. The infant's body differs from the adult's anatomically, histologically, and even chemically, the water content of the newborn being 75 per cent as compared to 67 per cent in the adult.

Some Differences between Infant and Adult

2. It is an organism peculiarly susceptible to extreme metabolism disturbances, such as dehydration and acidosis.

3. It is an unstable organism as evidenced by lack of temperature and central nervous system control.

4. The infant possesses little resistance and practically no immunity to infectious diseases.

As a result of these peculiarities, he demands the most skillful preoperative, operative, and postoperative care. The essential points to be considered are:

Essential Points in Operative Care

1. Prevention of dehydration.
2. Maintenance of body heat.
3. Prevention of infection.

1. *Prevention of dehydration:* It has long been known that from lack of food and water or as a result of vomiting, purging, or diarrhea, a child will rapidly lose weight and will soon fall into a precarious state. This is due to the loss

Prevent Dehydration

of body fluids known as dehydration or anhydremia. The disease which the infant is suffering from, the loss of blood during operation, and the anesthetic which is given, all combine to increase this condition which rapidly results in acidosis and intoxication. The object of the preoperative and postoperative care must be to prevent such conditions. Some of the methods of prevention are:

Avoid Catharsis

Catharsis is avoided before operation. The infant is given the regular amount of food just as long as possible, usually up to 3 hours before the operation. Fluids should be forced in every way for several days before it. They may be given:

a. By mouth, if possible, unless the child vomits.
b. By rectum, if possible, if the child will retain them.
c. Intravenously, if necessary, if other methods fail.
d. By hypodermoclysis, if necessary, if other methods fail.
e. Intraperitoneally, if possible, unless it interferes with the site of operation.

The postoperative care demands that the infant be given suitable food (usually breast milk is indicated) as soon as he can retain it, and all efforts to supply fluids in other ways are continued after operation.

To Maintain Body Heat

2. *Maintenance of body heat:* An infant's heat control is poor, showing wide variations of temperature due to the surrounding temperatures. Therefore, the operating room should be warm, 70° to 76° F.; the infant should be surrounded by hot water bottles during the operation, and should be exposed as little as possible. Wrap his arms and legs and as much of his body as possible with cotton; put warm blankets over him. Only the site of operation should be exposed. After the operation he should be placed in a warm bed and heaters should be applied as necessary to keep his temperature up to normal, for chilling is conducive to shock.

To Prevent Infection

3. *Prevention of infection:* Since the infant possesses practically no immunity to infection, he may readily contract

Aseptic Nursing

disease. Therefore, isolation and aseptic nursing technique are important for as long as possible before operation and

afterwards until he has completely recovered. This isolation is also beneficial because it keeps him quiet and away from disturbing influences.[1]

Preoperative Care of the Child.

Preoperative Care of Child

The same general principles regarding the preoperative care as given for the infant hold true for the child. The person who is caring for the child tries to:

Prevent Dehydration

1. Prevent dehydration.

   a. By avoiding catharsis.
   b. By forcing fluids.
   c. By feeding up to the time of operation if possible.

Prevent Infection

2. Prevent infection by carrying out aseptic nursing.

Avoid Catharsis

Catharsis is avoided before operation to prevent dehydration and acidosis. See that the child has a normal, free evacuation of the bowels daily for several days previous to operation and catharsis will not be necessary. If the nature of the case permits, in order to clean the lower bowel an enema may be ordered 4 hours before operation. Fluids are forced by mouth or, if necessary, in other ways as enumerated above for several days before operation; water by mouth may be given up to 1 hour before the operation is scheduled. Unless the nature of the operation forbids, the child is given his usual diet up to the day of the operation; 4 hours preceding a light meal is given, consisting of some high carbohydrate food, as cereal with milk and sugar. To prevent acidosis some authorities advise sodium bicarbonate and glucose in suitable doses 15 minutes before operation.[2]

A child of any age and especially the sick one lacks immunity and is very susceptible to disease; therefore, isolation and aseptic nursing are necessary. Several days before operation he should be given a separate room, if possible, where he may be isolated from danger of contracting dis-

[1] Rodda, F. C., M.D., "Abdominal Surgery in Infancy from a Pediatric Viewpoint." *Journal-Lancet*, Sept. 18, 1921.

[2] *Journ. Amer. Med. Assn.*, June 11, 1921.

ease, and where he may be quiet, as the latter is an essential factor. A specimen of urine must be collected the night before operation and examined carefully.

To Prepare Field of Operation

It is seldom necessary to shave the field of operation on a child, especially if he is under 6 or 8 years of age. If there is hair around the site, shaving is, of course, indicated and it may be ordered routinely for all extensive orthopedic operations, etc. With tact and patience it is generally possible to shave a child without serious difficulty. In most cases if the procedure and its necessity are explained to him before starting, he will coöperate. The nurse may make a game of it which will highly amuse him. If he is too active or irritable it may be wiser to wait and shave him after he is under the anesthetic. The individual case decides the details of this question as of all others discussed here.

To Shave a Child

To shave a child:

Equipment

1. Safety razor with blades (straight razor unsafe for use on a child).
2. Basin of soap solution.
3. Sponges.
4. Paper bag for waste.
5. Tissue paper squares to clean razor blade.
6. Hand towel.

Shave not more than 12 hours before operation, usually the evening before. The area should be definitely indicated in a written order. Special permission must always be obtained from the parents if the child's head has to be shaved, or if even a small amount of his hair has to be cut off, as for a mastoid operation, etc.

Preoperative Medication

Preoperative medication is given as ordered and is recorded on the child's chart. Atropin sulphate is ordered in most cases. Morphin is seldom used but chloral hydrate by rectum is sometimes ordered as a sedative.

To Urinate before Operation

The child should urinate within ½ hour before going to the operating room; if he does not it should be reported and he may have to be catheterized.

The child is given his routine morning bath, being sure that his nails are clean and that his head is clean and free from pediculi. He should be dressed in a shirt, stockings, nightgown, and diaper if necessary; a three-cornered drape is tied around his head to completely cover his hair. (See how to put on cap for treatment of pediculosis, Chapter VI.) His body is wrapped and pinned securely in a blanket; this is to restrain him and it is usually better to put it on before he leaves his bed since it has to be put around him as soon as he reaches the anesthetizing room. See that he has nothing in his mouth. Record on his chart the time he leaves for the operating room and accompany him there.

To Restrain before Giving General Anesthetic

A warm etherizing room and operating room, 70° to 76° F., and external heat during the operation are important factors for the successful postoperative recovery of any child. The nurse must see to these details, also that he is protected by warm blankets and that only the field of operation is exposed. Local anesthesia as well as general may be used for children.[3]

Prevent Unnecessary Exposure

Postoperative Care of the Child.[4]

While the child is absent his room and crib are prepared for his return; strip the crib and air the room well.

Post-operative Care of Child

To make an ether bed: In addition to the regular equipment for making a bed add:

Ether Bed

- One blanket.
- Rubber pillow slip or a piece of rubber the size of a pillow slip.
- Two emesis basins.
- Tongue depressor.
- Squares—gauze or old cotton cloth for mouth wipes.
- Postoperative record sheet.
- Pen and ink.
- Paper bag.

[3] Farr, R. E., M.D., ''Local Anæsthesia in Surgery in Infancy and Childhood.'' *Tr. Sect. Dis. Child., A.M.A.*, p. 162, 1920.

[4] Bartlett, W., M.D., ''After Treatment for Surgical Patients.''

Glass and drinking tube.
Two face towels.
Three safety pins.
Bandage.

Make the bottom part of the crib in the usual manner; put the blanket on over the draw sheet; fold up the two lower corners so that it may be pulled out easily without disturbing the rest of the bed; place the upper sheet, blankets and spread on the bed, not tucking them in at the foot or on the sides. Adjust the top of the upper bedclothes as for an open bed, fold them all back together in a roll even with the foot; at the side from which the patient will be returned to his bed roll all of them (including the extra blanket) even with the edge of the mattress. Remove the pillow slip from the feather pillow; place a rubber of the same size inside it and spread it at the head of the bed where the patient's head comes; hold it in place by pinning the two upper corners to the mattress at the head. (Do not pin through rubber.) Stand the hair pillow at the head of the bed and hold it in place by slipping a piece of bandage around it and the bars at either end. Fold a face towel over the upper edge of the bedclothes to protect them. Fill two hot water bags and place them in the crib, one near the head and one near the foot. Pin the paper bag to the head of the bed on the side nearest the table. On the bedside table place 2 emesis basins, tongue blade, mouth wipes, postoperative record sheet, and pen and ink.

After Operation

As the child returns from the operating room, the nurse who precedes him into the room quickly prepares the bed for him by rolling back the upper bedclothes and removing the hot water bottles. If any of his clothing is damp or soiled, it must be changed, exposing him as little as possible. Tuck in the upper bedclothes at the foot and the sides of the crib as usual. The extra blanket is left over him for 24 hours unless he is too warm. He should lie on his side. Postoperative care after general anesthesia should always

include prophylactic measures against so-called ether or aspiration pneumonia. This means keeping the child on his side or in the ventral position with no pillow until he is completely conscious. This should be done from the start, beginning with the stretcher which carries him from the operating room. During the following days his position should be changed frequently, not allowing him to assume the dorsal position except when unavoidable. The above caution applies particularly to the postoperative care of a child following tonsillectomy. When vomiting occurs the vomitus may be received in the kidney basin. After vomiting the patient's mouth is wiped out. The nurse must stay with him constantly until he is fully recovered from the anesthetic, i.e., until he is rational. She must watch the site of operation for hemorrhage, must take and record the pulse and respirations every 10 minutes for 1 hour, or until he is fully recovered, then must take them every 20 minutes for 3 hours. The temperature, pulse, and respirations must be taken and recorded every 4 hours for at least 3 days. The room should be 70° F. for 24 hours, then the usual temperature; it must be well ventilated, avoiding direct draughts. It must be quiet, no unnecessary talking should be allowed, and visitors and avoidable coming in and out are forbidden. The child's face and eyes must be shaded from direct light, either sun or artificial light, but sunlight must not be shut out. Aseptic nursing care must be carefully observed. If the nature of the operation permits, the child is usually given water by mouth as soon as nausea ceases and in as large quantities as possible. Milk is given as soon after that as it can be tolerated. Fluids in other ways, as by rectum, by hypodermoclysis, etc., are very often necessary to prevent dehydration or acidosis. Sugar solutions in place of plain water may be ordered or extra corbohydrate, as 5 per cent sugar in the milk. Sodium bicarbonate and glucose in regular doses are also given after as well as before operation by some authorities. (See note 2.) Light diet is given

Keep Child on Side

Change Position Frequently

Vomiting

Watch for Hemorrhage

Take Pulse and Respirations

Quiet

Aseptic Nursing

Force Fluids

as soon as possible. All these details depend entirely upon the nature of the individual case and must be considered as guides only. A record of the fluid intake and the urine output should be kept for at least 48 hours; the first urination after operation should be noted and the time is recorded. If the child does not void urine within 8 hours, it should be reported. A specimen of urine is secured routinely. The first defecation must also be watched for, and if normal bowel function is not established, it too should be reported.

Surgical Dressings.

Surgical Dressings The dressing over the wound is never changed until ordered; efforts must be made to keep it sterile and if it becomes soiled it must be reported. The usual surgical technique is observed in changing it. **Abdominal Binder** If the child has an abdominal incision, as after an appendectomy, he must wear an abdominal binder or swathe; this is best made of some light, firm material, as outing flannel, canton flannel, or twill; there should be various sizes to fit all ages. The abdominal binder should extend from just over the symphysis pubis up over the wound, but not high enough to bind the thorax; it should be pinned firmly in front; the slack at the sides is taken up with safety pins. The binder is held in place by perineal **Straps** straps; these are straps 12 to 15 inches long, 1 to 1½ inches wide, made of outing flannel. Pin the 2 straps with 1 small safety pin at the middle of the lower edge of the binder in back, bring them around to the front through the groins and pin one strap on either side of the midline of the lower front of the swathe with small safety pins. If a chest binder is worn, it is also held in place by straps over the shoulders; the 2 straps are pinned with 1 small safety pin to the upper edge of the swathe at the middle of the back, one strap being brought over either shoulder and pinned to the upper edge of the binder on either side of the midline of the front.

To Elevate the Foot of the Bed

Elevation of the foot of the bed may be ordered after operation, for instance, if the child is in shock. It is raised the desired height by means of (1) a mechanical adjustment, (2) by placing blocks of wood under the legs, or (3) by putting the foot of the bed on a protected table or chair. If the head of the bed is to be elevated for Fowler's position, it also is done by one of the above methods. A head rest and two or more pillows are adjusted behind the child's back and he is held in the correct position by the use of a knee roll or a foot sling. (See head rest, foot sling, knee roll, already discussed, Chapter V.) A cradle is used to keep the weight of the bedclothes from any part of his body. If necessary, it may be held in place by a piece of bandage or string around the cradle and under the springs of the crib. (The post-operative care of any particular diseases follows the description of these conditions in Chapter XX.)

(Note: This chapter has been read and approved by Dr. A. C. Strachauer, University of Minnesota.)

CHAPTER XXIV

THE ORTHOPEDIC NURSING CARE OF CHILDREN

By KATHERINE A. SMITH

Introduction:

Modern Orthopedic Surgery has been well defined by Berry as "the surgery of the deformities and disabilities of the apparatus of locomotion; the phrase, apparatus of locomotion, being used in a broad sense to include, not only the lower extremities, but also the trunk and upper extremities."

This subject occupies a vast field, and one of very great and general interest. Its most distinctive advance in recent years has been toward the prevention of deformity.

Every intelligent nurse with keen powers of observation is an important factor in this prophylactic movement. Her work offers countless opportunities for early recognition of conditions, which, if disregarded, develop into serious and permanent deformities.

The object of this chapter is to enable the nurse to recognize in the child any significant symptoms, so that she may refer the patient to proper medical authority at an early stage. Since limited space does not allow detailed discussion of all orthopedic affections, tuberculous disease of the hip and spine have been selected, since their favorable prognosis depends largely upon the skillful, conscientious handling by the nurse, through long years of treatment.

Orthopedic affections may be divided into two main classes: Congenital, and acquired. *Congenital orthopedic affections* are present at or before birth. They may be caused by

undernutrition, pressure, or heredity, although for many congenital malformations no cause can be determined. Examples of this class are club-foot, congenital dislocation of the hip or other bones, torticollis or congenital wry neck, and missing or supernumerary bones. *Acquired orthopedic affections* develop after birth, and follow disease, injury, faulty hygiene, undernutrition, or strain upon the body framework. In this group are included acute osteomyelitis, tuberculous disease of the bones and joints, arthritis, infantile paralysis (anterior poliomyelitis), spastic paralysis, poor posture, weak feet, and the various deformities following rickets or contractures due to burns or other injuries.

General Nursing Care:

Mental attitude of child. In the first place, to attain the best possible results the child himself must be made to cooperate by keeping the right mental attitude. If he has learned the curse of self-pity from indulgent friends or thoughtless attendants, teach him the satisfaction of being treated not as a cripple, but as a healthy individual, with a normal mind. Ignore his physical handicap, treat him with respect, and help him to develop his own resources. Happiness is relative, and a crippled child who is utterly miserable in a household of romping brothers and sisters, will be perfectly happy with a group of other convalescents. Any visitor in the orthopedic ward of a children's hospital will notice with great surprise the happy faces, the bursts of song, and the general air of contentment. For those cases whose treatment extends over many months or years the orthopedic hospital school, a recent institution where supervised treatment can be given while the child's mind is occupied with educational school work, is the ideal environment. Indeed the knowledge of occupational therapy is invaluable in the care of individual cases.

Care of the skin. The nurse is responsible for the condition of the skin of her patients. It is not always pos-

sible to remove apparatus for cleansing purposes, but the utmost vigilance is necessary to prevent the formation of pressure spots, which are not only a great source of discomfort, but which sometimes suspend other treatment for weeks.

These most frequently appear under a point of constant friction or pressure, such as the edge of a plaster cast, or under the weight of traction or any bony prominence like the knee or the ankle, or on the back of the heel. The foul odor of pus coming from underneath a plaster cast should always be investigated, and is sometimes the first indication of a pressure spot. The treatment obviously consists mainly in removing all pressure. The physician should be notified, and will direct treatment. Plaster casts may be trimmed, or have windows cut in them, while metal or other malleable materials may be slightly bent, readjusted, or padded with felt or cotton wadding.

Careful observation will prevent the development of a pressure spot beyond the point of redness, and further progress is usually a direct reflection upon the care of the nurse. The treatment of tissue injury may be indicated in outline form.

Treatment of Pressure Spots:

Stage	*Treatment*
I. Redness.	1. Removal of pressure. 2. Friction to restore circulation. 3. Application of alcohol or other hardening lotion.
II. Redness with broken skin.	1. Removal of pressure. 2. Drying powder such as aristol, dermatol, boric acid, or zinc stearate.
III. Dark bruise.	1. Removal of pressure. 2. Friction around discolored area to restore circulation and promote absorption. 3. Hot and cold applications to stimulate the blood supply.

IV. Deep discharging sore.	1. Removal of pressure. 2. Friction of surrounding area. 3. Heliotherapy. 4. Drying powder or hot antiseptic dressing. 5. Healing ointment such as compound tincture benzoin, aristol ointment or balsam of Peru.

Care of apparatus. The apparatus used for protection, fixation, and correction is of various kinds. It is strictly essential that the nurse understand the exact purpose of such apparatus, since in her daily care of the patient she is frequently called upon to readjust it. Misplaced splints or braces can undo, in an incredibly short time, the progress of tedious weeks. Splints and braces worn by growing children must be constantly watched and kept in good condition. The special shoes worn by children with weak feet need frequent repair; crutches are outgrown and need replacing; splints require occasional extension, and straps need mending. Deft readjustment of apparatus, slight loosening of a strap, or shifting of the affected limb will often relieve pain. These measures may be employed only with the permission of the surgeon, but should always be tried before resorting to drugs in acute cases.

Care of plaster casts. To avoid the necessity of frequent changing of plaster casts, a process which is painful and expensive for the patient, and is often harmful, several simple measures may be employed.

In the first place, to ensure an enduring cast, great care is needed while it is drying. This process requires from 48 to 72 hours, depending upon the thickness of the cast. During this time, the cast should be kept absolutely still, and all pressure on the heel or other prominences avoided. After application of a cast, the utmost care must be used in lifting patients on and off the stretcher. Casts are not infrequently ruined by cracking at this time.

Figure 47. Plaster Casts. Showing Method of Elevation

If any blood stains through the bandage, this discolored area is usually painted with tincture of iodin, to prevent possible infection.

With small children especially, the spica casts should be trimmed away as far as possible around the genitals, and these edges bound with oiled silk or rubber tissue, which is easily cleansed, and may be changed when necessary. Rubber wet with concentrated urine will scald delicate skin and must be kept clean. If the cast becomes stained, it may be washed with chlorinated soda, 1 to 64 solution, which is also a valuable deodorant.

As soon as the cast is entirely dry, the edges may be trimmed and bound with 1½ or 2 inch adhesive plaster, snipping the edges to fit smoothly around all curves. If stockinet has been used under the cast, it may be finished nicely by facing back on the outside of the plaster and binding down with adhesive.

Some surgeons have the cast painted with white woodwork enamel, to form a protective coat which is impervious to moisture, is easily cleaned, and prevents the crinoline edges of the bandage from fraying.

Postoperative care. Following operation or manipulation, there is usually swelling of the injured tissues. Plaster bandages, when employed for immobilization or protection, are applied before this swelling develops, and the child must be watched closely. When there is considerable swelling of an extremity inside the cast, this pressure restricts the circulation, and in toes or fingers at the end of the bandage we find hard swelling, and even cyanosis. On pinching the toes, if the blood returns almost immediately, there is no cause for alarm, but when the toes are cold and dusky, and the circulation very sluggish, there is danger from too much pressure, and this should be reported to the surgeon without delay. The nurse should elevate the afflicted part if possible, and keep it warm. If necessary, the doctor, or in emergency the nurse under his direction, will release pressure by bi-

valving the sides of the east with a sharp-pointed, eurved plaster knife, or plaster shears. The two halves of the east are bound together by wide bands of adhesive plaster, or webbing straps. The greatest eare must be taken not to eut the patient during this procedure. When it is neeessary to bivalve or remove a dry east, the plaster may be slightly softened with warm water eontaining peroxid or vinegar, and applied with a bulb syringe or small piteher.

Congenital Orthopedic Affections.

Congenital torticollis. This is a distortion of intra-uterine origin caused by painless shortening of the tissues on one side of the neek. The sternomastoid musele is primarily involved, although the trapezius also may be eontraeted espeeially in acquired torticollis.

Early treatment by manipulation will often effeet a eure. Posture should, as far as possible, favor the eorreetion of deformity. Extreme or neglected eases usually require operative treatment. Subeutaneous tenotomy and open incision are followed by fixation in an overcorreeted position by means of a plaster support. This is removed at the end of from 4 to 8 weeks, and massage, manipulation, and gymnastic training are begun. In those cases when intelligent manipulation cannot be obtained, a braee may be worn for several months with advantage.

Congenital dislocation of the hip. This is by far the most common and the most important of all the eongenital disloeations. It is a deformity in which the head of the femur is partially or eompletely displaeed from the aeetabulum. It may be present on one or both sides of the body, and is more eommon in girls than in boys.

The deformity is seldom reeognized until the ehild begins to stand and walk. The leg on the affected side is short, and there is unusual prominenee of that hip, eausing a limping walk. In double eongenital disloeation of the hips the child

walks with a characteristic waddle. X-ray pictures confirm the diagnosis.

Early treatment while the bones are soft and ligaments more elastic, is of the utmost importance in the prevention of permanent deformity. The hip is usually reduced by forcible manipulation, called Lorenz bloodless operation, although occasional open reduction is necessary. Operative treatment is followed by fixation in an overcorrected position in a plaster spica, and the patient is sometimes allowed to walk while wearing this bandage. Massage may follow the removal of the cast. Recurrence is not uncommon.

Talipes. This deformity is commonly known as club-foot. There are 4 simple varieties, and various combinations of these 4 types:

1. Talipes equinus. The foot is turned downwards, and the patient walks on the heads of the metatarsal bones.

2. Talipes calcaneus. The foot is turned upwards, and the patient walks on his heel.

3. Talipes varus. The inverted foot, which shifts the weight to the outer border.

4. Talipes valgus. The everted foot, which bears the weight on the inner border.

Talipes should be recognized at birth, and treatment begun at once. In no other congenital malformation are early diagnosis and treatment more important. A perfect cure both as to form and function is possible when early, efficient, prolonged treatment is given, while untreated talipes grows progressively worse.

The extent of the deformity and the age of the child determine the method of treatment to be employed. Manipulation, plaster casts for overcorrection, forcible reduction followed by plaster casts, special shoes, braces, and even open operation, may be necessary. There is a tendency to recurrence, and treatment should be continued until the deformity is overcorrected, and growth completed.

Acquired Orthopedic Affections.

Deformities following rickets. Rickets, or rachitis, is a constitutional disease of infancy caused by defective nutrition, of which the most marked effect is distortion of the bones. The most common deformities in the order of their appearance are craniotabes, rachitic rosary and enlargement of other epiphyses, rachitic bowing of the spine from lack of muscle tone, bow-legs, knock-knees, pigeon-breast, and Harrison's groove.

The prognosis depends upon the age of the patient, the severity of the disease, and the treatment employed. Proper dietetic treatment begun when the child is under one year of age will usually eradicate all traces of deformity within a few years. In older children, deformities of the trunk tend to disappear with age, while those of the lower extremities increase with weight bearing and activity.

Treatment is dietetic, hygienic, medicinal, and corrective, according to the age of the patient. (Prophylactic, dietetic, and medicinal treatment have already been discussed in Chapter XX.) Mild deformities, such as craniotabes, enlargement of the epiphyses, including rachitic rosary, rachitic kyphosis, and mild bowing of the extremities, usually respond promptly to this treatment. Slight bowing of the legs in infants is normal and disappears with growth. Abnormal bowing, especially when rachitic, should be recognized in the early months of life, and manipulation begun. The bone is grasped firmly by placing a hand at each end close to the joint. Gentle but firm pressure is exerted to bend the bone to a straight, and later to an overcorrected position. This exercise should be repeated several times, twice daily. With more extreme cases, braces may be used to hold the bones in an overcorrected position, and if this is not effective, operative treatment is necessary. The closed method of fracture, called osteoclasis, is usually employed, followed by fixation in a plaster cast. In older children, or any case of

extreme anterior bowing, an open osteotomy, with removal of a wedge of bone, is advisable. The bowing may be of various types, but the treatment is similar.

Deformities following anterior poliomyelitis. Anterior poliomyelitis, or infantile paralysis as it is commonly called, is an acute infectious disease. It is frequently seen in epidemic form, but the mode of transmission has not been determined. It is caused by a minute germ which attacks the central nervous system, causing inflammation, followed by injury or destruction of the cells. Changes are most marked in the anterior portion of the cord. Primarily, the paralysis is widespread because of interference with function caused by congestion and edema. Eventually the area is determined by the actual damage to the nerve cells and conducting tracts.

As in other acute infectious diseases, there is usually a sudden onset with elevation of temperature and general malaise, with possible vomiting or convulsions. Early symptoms often resemble those of an acute coryza. Paralysis of the flaccid type usually follows within 24 hours, and is accompanied by tenderness and pain on motion. In small children paralysis may be the first symptom noted. Fever and other acute symptoms disappear within a few days. After that time the pain gradually subsides, until by the end of 6 weeks only the paralysis remains.

The prognosis as to function depends upon the extent of cell injury or destruction, and the subsequent treatment of the weakened or disabled part.

Treatment during the acute stage does not come within the orthopedic range, but the importance of prophylactic measures at this time cannot be overestimated. Most authorities agree that while there is any muscle tenderness, absolute rest in bed is indicated. The position of the affected part may be changed, but the extremities should be supported in such a way as to relieve all unnecessary strain. Toe drop caused by the weight of the feet or bedclothes is a serious deformity, and may be prevented by supporting the toes

on a sand bag or firm pillow. After all pain has disappeared, massage, electrical treatments, and exercise will restore much of the lost power. Ultimately it may be necessary to resort to braces or operative treatment for correction of deformity.

Spastic paralysis (Little's disease). This disease is characterized by motor weakness, by stiffness and loss of control, rather than by paralysis. It is followed by contraction, atrophy, and deformity. Mental deficiency is a common sequel. There are four types: Spastic hemiplegia, involving one side of the body; paraplegia, involving lower extremities only; diplegia, involving both upper and lower extremities; and monoplegia, where the spasticity is limited to one extremity. By far the most common cause in children is cerebral hemorrhage at the time of birth.

The significance of early symptoms is rarely appreciated. Cerebral hemorrhage does not come within the orthopedic province, but its early recognition and the prevention of spastic paralysis should be included. Its frequent occurrence without death is attested to by the thousands of cases of mental deficiency, spastic palsies, epilepsy, blindness, and varying degrees of amentia. Infants born after instrumental or protracted labor, or any newborn baby showing some degree of asphyxiation or delayed spontaneous respiration, should be watched for symptoms of cerebral hemorrhage. Inequalities of the pupils, ocular palsies, hyperactivity of the reflexes, and twitching or convulsions may be present. Lumbar puncture is of great diagnostic and therapeutic value. Early decompression may relieve all symptoms and prevent the resulting brain injury and muscular spasticity which become apparent when the child is a few months of age. These children are restless, and repeatedly throw their arms and legs outward, and turn their heads in characteristic athetoid movements. They drool a great deal, and instead of normal sounds, the extreme cases make animal-like noises. Marked contraction of the adductor muscles is common, and causes the so-called "scissors gait."

The prognosis of cerebral hemorrhage is good, if diagnosed soon after birth and skillfully treated. The prognosis of neglected cases is poor. Patient care, mental and physical exercises, and special measures for building up the general nutrition are rewarded by slight improvement. In those rare cases where mental faculties are unimpaired, the coöperation of the child may be secured, and more accomplished for the relief of spasticity.

Treatment of spastic paralysis consists in building up the general condition, special mental and physical training, and operation to relieve the muscle contraction.

Obstetrical paralysis. Obstetrical paralysis of the shoulder and arm is caused by injury to the brachial plexus. This is a comparatively common result of difficult or protracted labor. It may be induced by direct pressure on the brachial plexus, but most often follows traction on the body or head, with violent twisting of the neck. There may be only hemorrhage due to bruising, but frequently the nerve roots are torn apart.

During the first month there may be local swelling and pain on motion. If the nerves are torn, control of the muscles is impaired, and atrophy is common. In extreme cases the arm hangs in an attitude of inward rotation with pronated forearm.

For mild cases receiving prompt treatment the prognosis is excellent. Function may be greatly improved although rarely completely restored when the birth injury was excessive.

Treatment consists in immobilization of the arm and shoulder by means of a cotton or plaster bandage. When the primary tenderness has subsided, simple massage should be started, and all strain on the deltoid relieved by a sling, splint, or cast. Operative treatment may be employed for the stretching of capsule and muscles, or for nerve repair.

Tuberculosis of the Hip.

Etiology. This disease may occur at any age, but it is most common among children. The tubercle bacilli usually enter

the body through the mouth, and become active when the resistance of the child has become lowered by illness, undernutrition, constant fatigue, or unhygienic surroundings. Trauma following a fall or blow is frequently the localizing cause.

Symptomatology. The bacilli usually attack the epiphysis of the neck of the femur, and gradually work through the head. As the infection spreads, the first symptoms to appear are a limping gait, pain on motion, muscular spasm, and distortion. X-ray examination at this stage frequently shows bone atrophy and destruction, and confirms a diagnosis of osteomyelitis, which from the absence of high temperature, and other symptoms of acute infection, is diagnosed tuberculous. Acute osteomyelitis of the bone is usually in the shaft, while tuberculosis is in the epiphysis.

If the first symptoms are disregarded, the infection burrows steadily through the head, resulting in joint involvement, which is very much more serious. There is now marked pain on motion, and the muscles around the hip are contracted, holding the thigh in a slightly flexed position to prevent strain. This muscle spasm sometimes relaxes suddenly during deep sleep, and the friction of the inflamed surface of the head against the acetabulum causes intense pain, so that the child gives a sharp piercing cry known as a "night cry." This wakens him, and with the return of consciousness, the muscles immediately contract again, protecting the joint, and the child drops off to sleep.

Before hip disease was diagnosed and treated in the earlier stages, the infection often ate away part of the head and neck of the femur, and spread to the acetabulum. As a result, the two opposing diseased surfaces healed together, forming a stiff hip, with more or less deformity, depending upon the position in which the leg was held by the contracted muscles. The most common deformity is flexion and adduction, although abduction is also occasionally seen.

Complications. (1) "Cold" abscess, so called because of

the absence of inflammation usually present in abscesses caused by other organisms, is the most common complication of tuberculosis of the hip. It causes little pain, unless there is great tension on the surrounding tissues. Unless the pain is severe, or the resistance of the body very low, the abscess is allowed to absorb. In opening a tuberculous abscess there is great danger of cross-infection, which is very serious. For this reason, many surgeons wish to withdraw the fluid by aspiration rather than incision when evacuation is necessary. The incision into a cold abscess must be dressed with the most perfect surgical technique. (2) Involvement of the second hip is not uncommon. (3) Meningitis occasionally occurs in those cases where the resistance of the child has been greatly undermined, and the absorption from diseased bone or abscess is great. (4) In adults, pulmonary tuberculosis is present in a large percentage of these cases, although rarely seen in children.

Prognosis. The object of treatment is to restore normal function and prevent deformity. This is accomplished when diagnosis is made early, and proper treatment carried out. In advanced cases, there is usually some permanent shortening of the leg on the affected side, and more or less limitation of motion. In extreme cases, complete ankylosis of the hip with shortening usually results. Complete cure is seldom effected in less than 3 or 4 years.

General Treatment. As in all tuberculous cases general hygienic measures are of supreme importance. A simple liberal, nourishing diet, and a regular daily program including much rest and fresh air, are essential. The efficiency of the treatment may be judged by the local comfort and general constitutional improvement.

The last few years have proved the great value of heliotherapy in surgical tuberculosis. The greatest benefit is derived from general body sun baths, although localized exposure with the use of special lens is valuable, especially in cases with discharging sinuses. The most remarkable result

of heliotherapy in joint tuberculosis is the preservation of motion, and even restoration of motion when partial ankylosis has taken place.

Local Treatment. The first step is to protect the joint from all motion or jar. This is accomplished by applying traction in the line of deformity. If muscle spasm is present, and holds the thigh slightly flexed, traction must be made in this line. If the existing deformity is disregarded, and the leg is pulled in a line parallel to the body, the contracted muscles will only increase their tension, and defeat the object of traction.

FIGURE 48. BRADFORD FRAME
Undivided Cover for Diaper Children.
Divided Cover Permitting the Use of the Bed Pan.

The common deformities in acute tuberculosis of the hip are flexion, with adduction or with abduction. To determine the amount of flexion, raise the extended leg until the spinal column rests flat on the bed. Traction must be applied with the leg supported at this angle. To determine the amount of ad- or ab-duction, swing the extended leg toward or away from the median line, until the crests of the ilia are directly parallel with the foot of the bed. Adjust the traction apparatus to pull at this angle. A small pad placed under the popliteal space is a comfort to older patients.

During the acute stage it is necessary for the child to remain in bed. Traction is most successfully secured by means of a Bradford frame, an adhesive extension, a pulley attached to the foot of the bed, and weights. The measurements of the frame are very important, since traction depends upon the fixation of the pelvis. The frame should be 4-6 inches longer than the patient, and the width between the crests of the ilia, the width of the frame. For older children the frame cover is divided, and the upper and lower pieces separated 6 inches to permit use of the bed pan. The lower edge of the upper and longer cover should come just to the edge of the buttocks.

FIGURE 49. TUBERCULOSIS OF THE HIP WITH ABSCESSES AND SLIGHT FLEXION DEFORMITY

A firm pelvic band fixes the pelvis to the frame, and a second narrower band is placed around the frame and over the well leg for restraint. The trunk is fixed by a muslin apron reaching from the pubic bone to the sternum, and extending to the edge of the frame on each side. This is held in place by 2 straps from the top center buckled under the corners of the frame to 2 side straps inserted in the apron just below the axillæ. The lower part of the apron is secured by means of straps buckled underneath the frame.

The adhesive extension is applied in spinal fashion, and attached to a footpiece from which a cord rolls over the pulley and is attached to the weights. The general rule for

weight is to put on as many pounds as the age of the child plus one. Traction correctly applied brings great relief.

As muscle spasm decreases, the leg may be lowered, and gradually reduced to a more normal position. This reduction is accomplished slowly, for if attempted too rapidly muscle spasm will immediately increase.

Avoid all jar of the injured joint. Turn the child off the frame by rolling him gently onto the well side, to bathe, rest, and rub his back. Never allow him to sit up, and see that the cord does not slip off the pulley. Move him as little as possible.

After all acute symptoms, i.e., muscle spasm, night cries, and elevation of temperature, have disappeared, the child may be put into a traction hip splint, the ones most commonly used being the Bradford abduction splint, the long traction brace, or a plaster spica. A high sole is attached to the shoe on the well foot, and with crutches for support the child is allowed up and around.

When all acute symptoms subside quickly, the parents are inclined to be too optimistic; they remove the apparatus just to see if the child can walk, and, finding he can, leave it off. The inevitable result is a recurrence, with increased bone destruction. The importance of prolonged conscientious treatment cannot be overemphasized.

Pott's Disease, or Tuberculosis of the Spine.

Etiology. Identical with that of tuberculosis of the hip.

Symptomatology. Pain, stiffness, weakness, awkwardness, and deformity, as the disease progresses. Guarded motion of the spine in walking; stooping by flexing knees and hips rather than back; when sitting, the weight of head and shoulders is supported by the hands, which grasp the chair. The tubercle bacilli attack the body of any single vertebra and destruction slowly spreads. If early symptoms are disregarded, the intervertebral disks and adjacent vertebræ become involved, and there is a buckling of these joints under the weight of the

upper part of the body, forming a kyphos. This is accompanied by a marked decline in the general condition of the patient. Due to pressure on the nerves coming from the spinal cord, abdominal or chest pain is often present. As in tuberculosis of the hip, there is muscle spasm over the diseased joint.

Complications. (1) Abscess is a frequent complication in Pott's disease. This is a serious complication, which may greatly prolong the duration of the disease for two main reasons. The resistance of the patient is lowered by the absorption from the abscess. Mechanical treatment must frequently be suspended because of local swelling. The abscess seldom appears immediately over the infected vertebra, but follows the line of least resistance, usually working its way along some muscle sheath until it finds room to expand. When the cervical vertebræ are involved, the abscess may be retropharyngeal, or deep cervical. In dorsal Pott's disease, the abscess often manifests itself in the mediastinum, causing dyspnea, coughing, and considerable discomfort. This is the most dangerous location for an abscess in Pott's disease. In Pott's disease of the lumbar region, the abscess usually follows the sheath of the psoas muscle, appearing in the lower abdomen, or it may be lumbar, iliac, or gluteal. (2) Paralysis of the lower extremities may result from pressure on the cord in the case of a sharp kyphos. (3) Meningitis is occasionally seen when the resistance of the child is low, and the bony destruction extensive. (4) Lung involvement is not uncommon in tuberculosis of the spine.

Prognosis. The object of treatment is to restore normal function and prevent or correct deformity. With prolonged efficient treatment, this is possible in early cases. When there is a large kyphos involving several vertebræ, the deformity can be greatly reduced, although not entirely removed. With the most efficient, persistent treatment, this disease is rarely cured in less than 3 or 4 years.

General Treatment. This is of the utmost importance. See tuberculosis of the hip, *General Treatment.*

Local Treatment. The fact that the spine is a weight bearing column, makes the treatment difficult. The principles of treatment are protection, hyperextension and immobilization. These can best be provided by recumbency in a posterior plaster shell, on a Bradford frame. To prevent further deformity, all pressure must be removed. Correction of the existing deformity is accomplished by hyperextension of the spine, using the angle of the kyphos as the pivot. The advantage of the posterior shell lies in the fact that it provides

FIGURE 50. POTT'S DISEASE, SHOWING POSTERIOR SHELL TREATMENT.

a firm, comfortable support, allowing almost no motion of the trunk, which would jar the injured vertebæ. This is also one of the most efficient means of securing hyperextension. The child in the shell is strapped to a Bradford frame to stabilize the shell, and restrain the child. In handling these delicate cases, the nurse must be deft, firm, and gentle. The back, and especially the skin over the kyphos, needs special care. There is great danger of a pressure spot over the bony prominence, and this may be avoided by cleanliness, hardening of the skin, and adjusting of the shell padding, so that the weight comes just each side of the spinous process, rather than directly over the point. The pads, over which the column is

hyperextended, are usually fixed 1 inch apart, to relieve all pressure over this prominence. The child should be *moved as little as possible,* but it is usually necessary to turn him out of the shell at least once a day. The most satisfactory method is to apply the anterior half of the shell, strap it into place, turn the child upon his face, and remove the posterior shell. This gives a minimum of jar and motion, and exposes the back for bathing, rubbing, restful change of position, and sun treatment. If there is no anterior shell, the child is turned in the following way: Loosen all straps and clothing. Raise the

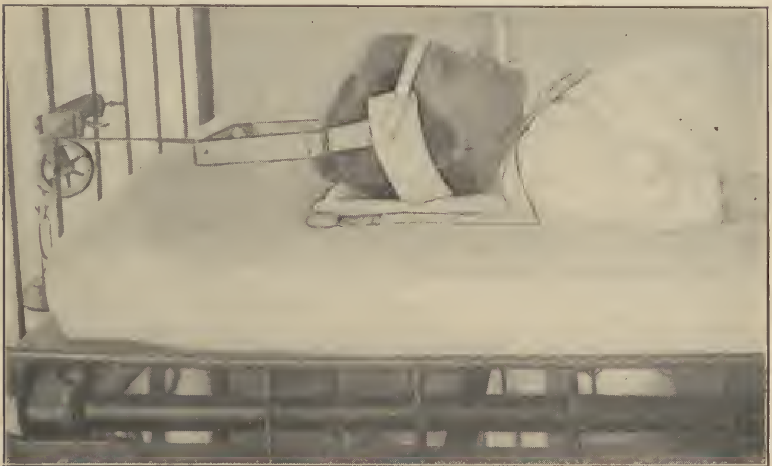

FIGURE 51. SHOWING METHOD OF HEAD TRACTION SOMETIMES USED FOR CERVICAL POTT'S DISEASE

child's hands over his head. Tell him your purpose, and instruct him to hold his body stiff and straight. Grasp him by the knee and shoulder, and slowly turn him upon his face.

When acute symptoms are absent, ambulatory treatment in a leather or plaster jacket or a steel back brace is sometimes advised.

To shorten the period of convalescence two operations may be performed. They are more successful in adults than in children. Dr. Albee's operation is the one most frequently employed, and consists in providing the affected part of the

spine with a natural, permanent splint. The spinous processes are divided, and a long splinter of bone from the tibia is inserted. When the graft is healed, this portion of the back is stiff.

A second operation, used more for adults than for children, is Dr. Hibb's. The spinous processes are bent down, one over the other, forming with the periosteum a bony ankylosis in the region of the kyphos.

Weak Feet. Every nurse realizes the value of strong, normal feet. Much of the foot trouble in adults may be traced directly to improper shoes, incorrect walking habits, and untreated weak feet during the early years of life.

In young children, the most common cause of weak feet is poor muscle tone due to general undernutrition. With relaxation of tendons and muscles, the arch drops, and it is the abnormal contour of the foot, described by the term "flat foot," which first attracts the mother's attention.

The arch should be supported in the normal position by means of inner sole pads, or building up of the outer sole of the shoe. At the same time the general condition of the child is improved by dietetic and hygienic measures, and within a few months the original tendency to weak feet has entirely disappeared.

When a child begins to walk he should have the support of broad, firm soles. If the ankles are weak, high shoes are indicated until these muscles have been strengthened.

Sudden onset of foot trouble in older children is commonly caused by improper shoes, faulty position in walking, and undernutrition.

The first symptoms are pain in the arch, ball, ankle, or in the leg. On examination the foot may be apparently normal, but observation shows an improper walking attitude, or cramped and ill-fitting shoes. There may be sagging of the ankle, eversion of the foot, and later actual displacement of the bones of the arch.

Shoes should be broad enough to allow ample room for the

toes to grasp the ground in walking. This strengthens the arch muscles, and is the normal function of the foot. The heel should be broad and low, and the length of the shoe between ½ to ¾ inch beyond the great toe when the child is standing.

The fact that the comparatively small foot surface bears the weight of the entire body many hours each day makes the study of this part of the body especially interesting. The anatomy of the foot is intricate, and it is easy to understand why slight shifting of body weight or crowding of the bones can cause so much distress.

The normal attitude of the foot in walking is slight adduction as the step is taken. This throws the weight of the body to the outer side of the foot, and back onto the ball. In walking with the toes turned out, the weight of the body is shifted from the outer side of the foot to the inner, which is not prepared for this added strain and breaks down. When standing, the feet should be slightly everted, since both feet are on the ground at once, and a more perfect balance is maintained. Confusion of these two attitudes is the cause of a great deal of foot trouble.

"Pigeon-toe" is usually a symptom of weak feet, and the treatment is the same as that given above. This attitude is an involuntary effort to avoid deformity.

Alternating hot and cold douches, one minute each, for five or ten minutes twice daily, will stimulate the circulation and improve the muscle tone. A set of simple exercises which should be practiced twice daily are very beneficial.

Exercise for Weak Feet:

1. Walk across the room and back, in the proper attitude, 10 to 20 times.
2. Stand with the feet straight ahead, and parallel to each other; slowly raise to the tiptoe position, shifting the weight to the outer border of the foot; slowly lower the heels to the floor. Repeat this 20 times.
3. Have the patient lie flat on his back. Bend the toes

downward, then upward, then in a circular motion. Repeat 20 times.

4. Raise the child to a sitting position on a bed or table. Stand facing the child, and place the palms of your hands against the balls of his feet. Have him press slowly against the resistance of your hands. Repeat 20 times.
5. Stand on one foot. Try to grasp the round rung of a chair with the toes of the other foot. Repeat 20 times.

Lateral Curvature of the Spine (*Scoliosis*). Lateral curvature of the spine is an habitual or fixed deformity in which the spine is more or less inclined to one or the other side of the median line. It may occur at any age, but the majority of cases are first noticed about the age of puberty.

The most common causes of scoliosis are general weakness, fatigue, habitual posture, occupation, rachitis, or scoliosis secondary to disease or deformity. Ill-fitting school desks are a contributing cause in many instances.

Prognosis is excellent in early cases due to habitual posture, weakness, and fatigue. Lateral curvature in a young child is of far greater importance than in an older subject because of the probability of an increase of deformity. Incipient deformity may be cured and cure is not impossible even when deformity is more advanced, but in this more than in any other postural deformity absolute cure implies early diagnosis and prevention rather than the correction of fixed distortion.

The first and most important preventive measure is the discovery of deformity or the tendency to deformity at an early age. Children should be stripped for all physical examinations.

Principles of treatment include all measures for the improvement of general nutrition; avoidance of overfatigue; the prevention of predisposing postures, and the correction of existing deformity.

The methods of local treatment, prescribed according to the requirements of the individual case, are as follows:

1. Corrective exercises.
2. Gymnastic training.
3. Support of weakened muscles by means of a light brace or leather or plaster jacket.
4. Corrective jackets under which increasing pressure is brought to bear over the bony prominence of the deformity.

Operative treatment is not very successful and is seldom advised.

Postural Kyphosis (Round Shoulders). This is a common deformity, and in childhood its etiology is similar to that of lateral curvature. Clothing which restricts free motion may be a predisposing cause.

Round shoulders are frequently accompanied by flat chest and prominent abdomen. Habitual deformity may cause serious and permanent displacement of the viscera. Many of the digestive disorders of later life may be traced directly to this cause.

Treatment is identical with that for mild cases of lateral curvature. Improvement of the general nutrition, assumption of a soldier-like erect attitude in both walking and sitting, and corrective exercises are the most important measures.

Conclusion. One chapter on the nursing care of orthopedic conditions will prove quite inadequate to those students who are especially interested in orthopedic surgery. The following list of books will be found useful for further study.

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CHAPTER XXV

THE EDUCATIONAL VALUE OF OCCUPATIONAL THERAPY IN THE CARE OF SICK CHILDREN

By Susan E. Tracy, R.N.

When a child is overtaken by an illness it is usually felt to be an interruption to his education. If by education is meant only that process which goes on inside the schoolroom this is doubtless true, but a far greater truth is that it is really impossible to interrupt his education. Educated he will and must be by any and all agents which call out from his own mind that which is there to respond. Wherever a child finds himself, there he finds his education. If the aim be to conform to the accepted methods of the schools the education of the sick child must be supervised by teachers from these schools and the practice of sending to the bedside of such children teachers who will keep them along with class work is in force in many cities. Much good work has resulted from this method. In the case of the youngest children this teaching becomes true occupational therapy since the kindergarten has always been a powerful help in treating the little ones. The employment of this method with older children and even with adult patients is far more advantageous than is generally supposed. This may be credited to the fact that "man is always and everywhere a motor animal; his normal reaction being a motor reaction."[1]

Formerly disease was vanquished by various "charms." There has been found in all primitive peoples that which has responded to this form of treatment and we shall do well to revert to ancestral types. It matters not whether the child

[1] Crile, George, M. D., "The Origin and Nature of the Emotions."

be a hospital patient or a private home case, rich or poor, as he may be called, we may draw around him a magic circle; his own mind the center of this circle while the teacher marks the sixteen points of its circumference. The charm in the process lies largely with the teacher. The education of the

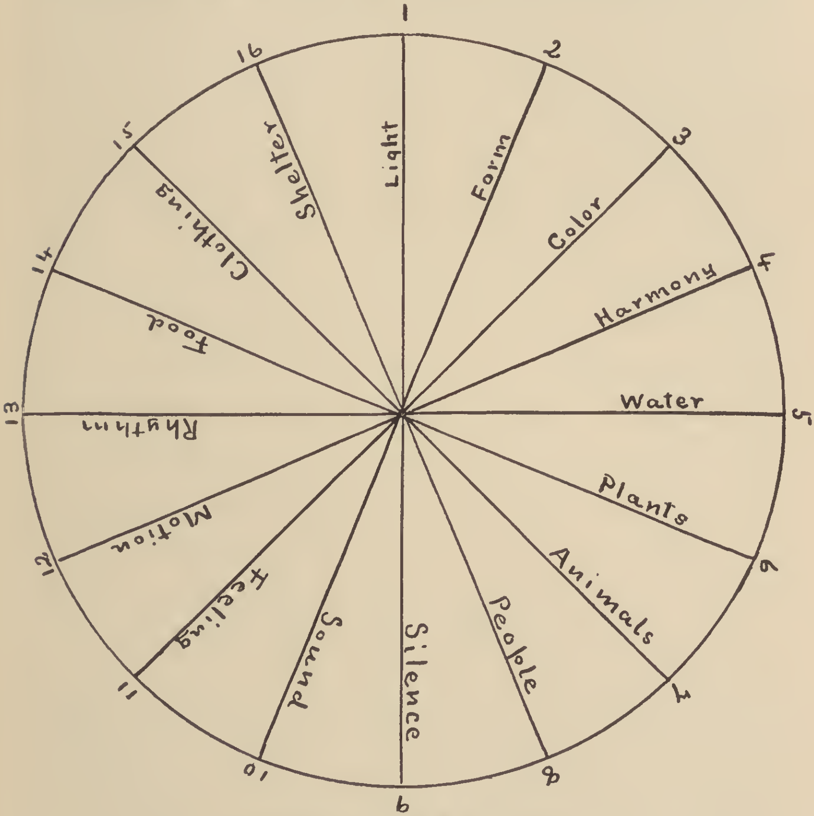

FIGURE 52. THE MAGIC CIRCLE

sick child may be most unhappily developed or it may be a constantly increasing joy.

Let us suppose that the magic circle be started with a lesson on Light. A true light-treatment. The fear of darkness is often very great with little children. A lesson on light will help to dissipate this fear. Candle-making is a charm-

ing occupation. Molds may be made of cement or even sand or earth. A small box of earth can serve for this purpose. The melted paraffin and a soft string for a wick is all that is needed. From candles the step may be made of modeling a crude little oil lamp such as is used by the dwellers in arctic huts. This lamp is formed of clay. Many charming lanterns can be designed, very thin sheet brass being a good material for these. What becomes of the darkness? This is a successful treatment if the child learns that it is quite in his own power to abolish it.

The second point in the magic circle is the study of perfect Form. Here one is happily provided with a wonderful series of balls. To teach appreciation of the sphere, mix a pure white salt-bead paste. This is done by using one part corn-starch to two parts table salt. Mix thoroughly while dry and heat very hot without scorching. To this add one part boiling water, mixing quickly and thoroughly. Knead smooth and mold into uniform balls. Let these harden, after which they may be used as marbles or pierced before quite hard to form beads. To be able to make a dozen or more of these beads of equal size and shape is a good test of sense of form and judgment.

Next in the circle comes Color. Mix a second lot of salt and starch paste adding to this, in the boiling water, a little coloring matter. This may be had from a scrap of crêpe paper or pigment of any sort. If time and interest warrant, divide the dry salt and starch into several lots, using a different color with each portion. This results in a charming series of plastic lumps which furnish much entertainment.

The whole world loves a ball. Why? Possibly because all live upon the surface of one. Men, women, and children all play ball. A series of some twenty-odd balls have been designed and worked out by nurses in different hospitals. In one institution in the middle west a lesson in nursery astronomy was developed from these balls. Over a round table was hung a small umbrella from which the handle had been cut away.

The whole top and under side were covered with deep blue paper. From the center was suspended a great golden sun-ball made of fluffy wool with rays of different lengths. After this the earth-ball was made with white poles, green temperate zones, and red and orange tropics. Jupiter with his many moons, Venus, Mars, and Saturn with his wonderful ring, were fashioned. Wooden beads were used for the moons. These, all hung with well-nigh invisible threads from the blue dome, formed a fascinating solar system. Now, to the music of some simple little hymn sing—

Smooth and round, smooth and round,
Rolling all along the ground,
Spinning high in upper air
Go the bright balls everywhere;
From my hand I send you free,
Soon returning unto me—
Wondrous spheres of light and shade!
Perfect form which God hath made.

Round and round, round and round,
Turns the earth without a sound,
In the bright skies near and far
Shines the light of many a star,
Balls of beauty and of light,
Swinging clear in God's own sight,
Star with star they each and all
Are forever playing ball.

Harmony follows the Form and Color lessons. The stringing of colored beads, the decoration of the sphere, the showing of light through colored shades, the mixing of a series of colored waters in tiny phials which can be arranged variously, the blowing of soap-bubbles and observation of their colors—all these occupations help to answer the questions—"What does light do to color?" and "What does color do to light?" The prism "Jack-o'-lanterns" on the wall, the "Broken Sunlight" game, teach harmony and prove the truth of the expression that "Beauty lies in harmony and not in contrast; and harmony is refinement." [2]

[2] Montessori, Maria, "Montessori Method."

A lesson on Water will be a delight. Pure, colorless water first. How good it tastes to the little sick child! Then water yellow with orange juice, pink with raspberry juice! The difference between an empty cup, a full cup and an overflowing cup is interesting. Catching rain-water, melting snow, watching ice melt, asking ourselves the question—"Why do we not get a cupful of water from a cupful of ice?" helps to vary the lesson. Think about still water, then running water, making wells, canals, and rivers, water-wheels, water-falls, and then boats. At first the boat is only a floating chip, a raft, a quickly folded paper boat made from the wax paper lining the biscuit-box and so able to really float, later it becomes more elaborate, made from wood and metal. Whenever possible finish this subject with a swimming lesson.

Plants come sixth in the circle. Seeds to be planted and tended, bulbs to blossom, cuttings from bouquets to be rooted in water or sand, trees to be drawn, painted, cut out or made from twigs or wire, flowers to be studied and copied in all sorts of materials, this will open up the plant-world to any child. A lovely little greenhouse can be made by cutting down a small wooden box to a slant-roof top and tacking on a strip of wood along the lower edge on which a piece of window-glass rests. The box holds a layer of plain sand in which is set all sorts of bits of growing things. A piece of geranium, or any scrap of plant which comes to hand. When rooted, these must be potted off into tiny pots of earth. Do not keep the sand too moist.

Animals come next. Our world is expanding rapidly. These animal toys are the delight of every child. Modeled from clay or salt-bead mixture, which is warmer and more comfortable, cut from paper, made from cloth and stuffed, quickly contrived from fruits, vegetables, or seeds, drawn, painted, or impersonated by the child himself, in any case, the charm holds. The fuzzy kitten and the curly dog keep the first place in the child's affections.

People! The crowning creation. Dolls of all nations, times,

and events now enter. Paper dolls, rag dolls, improvised dolls, dolls from "Mother Goose" and Hans Andersen, loved, recognized, and imbued with life by the little patient. No child need ever be shut away from people for the butcher doll calls at his bedside, the fisherman takes him out in his dory, Mother Hubbard finds a bone for his dog, and little Puck whisks him around the world.

And now that the child's world is peopled we may give a little time to sense-training. No more beautiful example of such a lesson will be found than that given by Madam Montessori on "The Silence." She writes: "I have established several *games of silence*. . . . I call the children's attention to myself, telling them to see how silent I can be. I assume different positions; sitting, standing, and maintain each pose *silently, without movement*. A finger moving can produce noise, even though it be imperceptible. We may breathe so that we may be heard. But I maintain *absolute* silence, which is not an easy thing to do. I call a child and ask him to do as I am doing. He adjusts his feet to a better position and this makes a noise! He moves an arm, stretching it out upon the arm of his chair; it is a noise. His breathing is not altogether silent, it is not tranquil, absolutely unheard as mine is.

"During these manœuvers on the part of the child, and while my brief comments are followed by intervals of immobility and silence, the other children are watching and listening. Many of them are interested in the fact, which they have never noticed before; namely, that we make so many noises of which we are not conscious, and that there are *degrees of silence*. There is an absolute silence where nothing, *absolutely nothing* moves. They watch me in amazement when I stand in the middle of the room, so quietly that it is really as if 'I were not.' Then they strive to imitate me, and do even better. . . . When the children are trying in this way there is established a silence very different from that which we carelessly call by that name. It seems as if life gradually

vanishes, and that the room becomes, little by little, empty, as if there were no longer any one in it. Then we begin to hear the tick-tock of the clock, and this sound seems to grow in intensity as the silence becomes absolute. From without, from the court which seemed silent before, there come varied noises, a bird chirps, a child passes by. The children sit fascinated by that silence as by some conquest of their own. 'Here,' says the directress, 'Here there is no longer any one; the children are all gone away.' Having arrived at this point, we darken the windows, and tell the children to close their eyes, resting their heads on their hands. They assume this position and in the darkness the absolute silence reigns. 'Now listen,' we say, 'a soft voice is going to call your name.' Then, going to a room behind the children, and standing within the open door, I call in a low voice, lingering over the syllables as if I were calling from across the mountains. This voice, almost occult, seems to reach the heart and to call to the soul of the child. Each one as he is called, lifts his head, opens his eyes as if altogether happy, then rises, silently seeking not to move the chair, and walks on the tips of his toes, so quietly that he is scarcely heard. . . . Having reached the door, with a joyous face, he leaps into the room, choking back soft outbursts of laughter."

Naturally following this a lesson on Sound will be expected; sounds of wind, water, rain, music. What is the difference between noise and music? The simplest instruments can be tried. A row of glasses of different sizes, partly filled with water, give varied notes. A willow whistle made at the bedside is a good example. A choice little concert was given by a hospital engineer with no other instrument than a lilac leaf. On this he played familiar, sweet old songs, and charmed a whole ward.

Feeling or touch-sense is taught to defective children by a game which is good for all. A cloth bag is partly filled with bits of different substances, little form being permitted. The child's hand is thrust into this bag and the string is drawn

up around the wrist. He is then asked to name the contents by the sense of touch alone.

In the lesson on Motion a pendulum is of value, also an old clock taken from its case and set to running, waterwheels, the muscles of the child's own body, and even a motor. Teach the difference between absolute quiet and motion and practice these.

The Sense of Rhythm develops as we watch waves, cradles, drums, woodpeckers and dancing. Relate this back to form and find in any picture or design, the lines that rime.

And now, being surrounded by creatures of sense, we must provide them with Food, Clothing, and Shelter. These last three lessons are played by every child. Marketing, cooking, making of dishes, doll-dressing, sewing and weaving; last of all, tents or houses. No pasteboard box but has the possibility of a house, no scrap of cloth or leather but may form a wigwam. One of the best things which a nurse can learn is to be able to take exactly what lies within reach and from these things create new and attractive models. The nurse who sits beside a surgical case may easily shape from absorbent cotton, animals, dolls, or snow-scenes, with charming results. If, after forming, a bit of color be applied (even coffee can be used), and when dry, brushing the toys over with shellac, there will be permanent value realized.

By this time some one is asking, "Where is the therapeutics in all this?" Lessons are planned but therapy means the application of remedy to disease. We live in a thought-world; when one is ill his thought is not well-directed, it strays into unwholesome paths. To direct thought into wholesome channels is the first great office of occupational therapy. Physical changes follow as thought leads and it is logical to expect improved conditions throughout the body. Corrective exercises may be illuminated by being given in the form of occupations. It is far more inviting to exercise muscles with a visible, tangible result than to do so on abstract principle. Every piece of work is a witness to power. This is a prized

possession. To know that illness has not deprived one of power even though that power be manifested in new and heretofore unvalued activities, raises one at once from the ranks of those "laid on the shelf." The more creative the work the greater the power manifested. Man, woman, or child will bow before one who can express beauty with that which has formerly been accounted worthless.

Two years ago a series of tests were made in the pneumonia and empyema wards in the children's department of the Boston City Hospital. All the cases were of the acute type. No child was well enough to be sent to the Convalescent Home. Children with miserable ashen faces, with little breath, propped up with slow-discharging wounds, coughing children, nauseated children, children with temperatures high and low, a truly abject set of little ones they were. In all cases of severe illness a sense of insecurity is experienced. Even a delirious patient may be helped just here by occupational therapy. The simplest manual labor is to *hold something.* The person who feels insecure wants to hold on to something. This impulse may be utilized to good purpose, for the sickest child will often hold a thing placed in his hands. Sometimes a sick baby will hold a wilted flower all day long. A pretty paper-fold is of much value here. The sickest child in this ward, a boy who had no breath to use up in words, held out his hand for a flying bird. The next step was to make the bird fly which called for slight finger-action only. From this he went on making the folds for a house, then the other forms of work and, as his powers increased slowly, he made balls, pocketbooks, baskets, etc. These children made Indian splint baskets, stuffed soft toy animals, made several friezes telling the "Noah's Ark" story and others by this means. They stenciled mats, made cork and pin furniture, knit, sewed, did simple leather work and turned out so many pieces that three cases were filled for exhibition at "The Children's Museum."

It was interesting to see how the children themselves be-

came teachers. When a new case was brought in they would say, "Now you begin with just the *easiest* things. We'll show you how, and then you will soon do the harder things." They begged for more hours of teaching and were themselves wonderful demonstrators. Not one case was found where work had to be taken away because of unfitness for so sick a child. If these children could be helped by occupational treatment it would surely indicate its use in acute conditions.

The mistake is sometimes made of blaming a patient for lack of interest. This is never wise since different substances, mankind included, kindle at different temperatures. A hospital ward presents all sorts from hard coal temperaments to gasoline, or even sulphur types. At times the latter seem to predominate and an enthusiastic following is quickly gathered, but more often considerable time must be spent on the part of the teacher in merely raising the temperature to kindling point. The aids to this are first a *true good* nature. To be just as much interested in the child who does not and apparently will not work, requires real devotion. Good models freely shown and of much variety, are of great assistance. Quietly working in the sight of the patient without asking him to participate will many times bring about the desired result. Sometimes half the period must be spent in this way, but at a given point the interest blazes up.

Off from a large ward filled with cardiac cases was a smaller room for a few patients. In this small ward were two little girls. The only thing which they saw or could see through the always open door was a third child who was apparently dying and suffering greatly. Suddenly another object crossed the field of vision. A "Berkshire Bird" flew in. Just one little canary in a ring but what a wonderful change he wrought! The attention of the two little girls was held captive and soon three more canaries were in sight. All the conversation in the room turned to bird-making and love and admiration were lavished on the newcomers. Here, indeed, was kindling temperature quickly reached.

FIGURE 53. THE FINDING OF MOSES
(Courtesy of the Bartlett Sisters and the Home of Truth, Boston, Massachusetts)

In another room five children are telling the story of "The Finding of Moses." These are not sick children but are banded together as "Help-one-anothers." The first part of the play is silent. We all close our eyes and go to Egypt. Then each one tells what she saw in Egypt. One saw the great stretch of brown, sandy desert and the sky, nothing more. The next saw the pyramids and the sphinx; the next saw the winding river Nile, the next a part of a temple and some little people far off with water-jugs on their heads. And then came one who saw Pharaoh's daughter with her maids, and little Moses in his basket. All these characters were made and dressed, just rag dolls, but Egyptian rag dolls. The children posed for the group and the patterns were made as they posed. Then came a great picture-building of the scene which was to cover a dingy wall. All that the children saw in Egypt went into this background while the dolls were grouped on the shelf in front and the baby Moses lay in a cunning basket made by one of the children from a few corn-husks. Moses himself was made of absorbent cotton tied with sewing thread. The walls of any child's room might be made more interesting by such a play. This method of teaching is just as well suited to ward patients. It is group work of a delightful type. It needs only loving coöperation to make the dullest wall express history, geography, study of form, color, harmony, proportion, perspective, grouping, sewing, basketry and unity which binds all in One.

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